TAMIL NADU AGRICULTURAL UNIVERSITY

SIXTH ANNUAL REPORT

April 1, 1976 to March 31, 1977

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1. INTRODUCTION

This is the Sixth Annual Report of the University covering the period April 1, 1976 to March 31, 1977. During the year, sustained efforts were made to further develop the research activities in an integrated manner so as to evolve the relevant technology for more efficient utilisation of land, water and sunlight. In these efforts the counsel of the State Development Departments and of the experts from the Indian Council of Agricultural Research was taken.

1. The authorities of the University functioned in a normal manner during the year. The Board of Management met at regular intervals and took several important decisions, the major ones being (a) starting of a Fisheries College at Tuticorin commencing from the academic year 1977-78, (b) setting up of the Kumara Perumal Farm Science Centre near Tiruchirapalli, and (c) reservation of 18 per cent of posts for the Scheduled Castes and Scheduled Tribes candidates at the first level of recruitment for the technical and non-technical posts in the University. The Academic Council approved (a) the introduction of additional new courses to the B Sc. (Agri) degree programme, (b) transfer of Statistics Wing from the Faculty of Agriculture to the Faculty of Basic Sciences and Humanities, (c) creation of the Department of Forage Crops in the Faculty of Agriculture, and (d) starting of a one-year Post-Graduate Diploma Course in Agricultural Business Management. The various Boards of Studies and the Boards of Examinations continued their supportive role to the Academic Council.

2. Field-oriented, programme-specific and time-bound research projects were carried out during the year. In all there were 1,224 projects in the various Faculties and Research Stations, excluding that of Veterinary College and the Research and Training Centres. The research activities under all these projects were reviewed by the Vice-Chancellor along with the Director of Research and the concerned Head of the Institution. In all 522 research papers were published during the year as against 481 last year, of which several of them were published in internationally reputed journals outside India. As a result of the combined efforts of the scientists in the Departments of Plant Breeding, Plant Physiology, Agricultural Entomology, Plant Pathology, Agronomy, Soil Science and Horticulture, seven new high yielding varieties of crops viz., Co. 40 Rice, Co. 21 Sorghum (Cholam), Co. 6 Pennisetum (Cumbu),

as constituent units of the University, with effect from December 1, 1976. With the addition of this major activity in the State concerning teaching and research in one of the important branches of Agricultural Sciences, as defined in the Act, the University has now obtained a fuller shape. The budget of the University has also increased substantially during the year. With the continued financial support from the State Government and the Indian Council of Agricultural Research as well as from some of the philonthrophic agencies such as Soil and Health Foundation, Pennsylvania, U. S. A., the Seshasayee Paper and Boards Limited, Erode and several other institutions, the Budget Estimates as approved by the Board of Management for the year 1977-78 stands at Rs. 571 84 lakhs as against Rs. 133.63 lakhs for 1971-72. About 11 new Research Projects financed by the Indian Council of Agricultural Research and other agencies at a total cost of Rs. 8.89 lakhs were added to the University's programme during the year under report.

2. UNIVERSITY ADMINISTRATION

2. 1. **Officers of the University:**

Chancellor	:	Thiru K. K. Shah Governor of Tamil Nadu (upto June 15, 1976) Thiru Mohanlal Sukhadia Governor of Tamil Nadu (from June 16, 1976)
Pro-Chancellor	:	Thiru R. V. Subrahmanian, IAS (upto January 31, 1977) Thiru P. K. Dave, IAS (from February 1, 1977)
Vice-Chancellor	:	Dr. G. Rangaswami
Registrar	:	Dr. T. R. Subramaniam
Comptroller	:	Thiru M. Balasubramaniam
Estate Officer	:	Thiru S. Jaganathan
Dean, Agricultural College and Research Institute, Coimbatore	:	Dr. V. N. Madhava Rao
Dean, Agricultural College and Research Institute, Madurai	:	Dr. C. V. Govindaswamy
Dean, College of Agricultural Engineering, Coimbatore	:	Prof. C. R. Shanmugam
Dean, Basic Sciences and Humanities, Coimbatore	:	Dr. D. Raj
Dean, Veterinary College, Madras	:	Dr. V. Rathnasabapathy (from December 1, 1976)

	Director of Research	: Dr. Y. B. Morachan
	Director of Extension Education:	Dr. S. Jayaraj

2. 2 **Board of Management :**

1.	Dr. G. Rangaswami Vice-Chancellor	: Chairman
2.	Thiru R. Natarajan, IAS Special Secretary to Government, Agriculture Department Tamil Nadu	: Member (upto June 27, 1976)
3.	Thiru H. M. Singh, IAS Special Secretary to Government, Agriculture Department Tamil Nadu	: Member (from 1-7-76 to 9-7-76)
4.	Thiru K. Venkatesan, IAS Secretary to Government, Agriculture Department Tamil Nadu	: Member (from July 10, 1976)
5.	Thiru S. Guhan, IAS Secretary to Government, Finance Department Tamil Nadu	Member
6.	Thiru A. Venkataraman, IAS Director of Agriculture, Madras	: Member
7.	Thiru R. Nagarajan, IAS Director of Fisheries, Madras	: Member
8.	Thiru L. M. Menezes, IAS Director of Animal Husbandry, Madras	: Member
9.	Thiru K. A. Bhoja Shetty, IFS Chief Conservator of Forests, Madras	: Member
10.	Dr. B. W. X. Ponnaiah Agricultural Scientist, Madras	: Member
11.	Thiru K. A. P. Viswanathan Crop Farmer, Tiruchirapalli	: Member

12.	Janab Haji E. K. M. Ghani Sahib: Livestock Farmer, Erode		Member
13.	Thiru K. V. Subbiah Agro-Industrialist Pudukottai	: :	Member (upto April 6, 1976)
14.	Thiru K. Chockalingam, IAS Chairman, Agro-Industries Corporation Ltd., Madras	:	Member (from April 7, 1976) (upto February 24, 1977)
15.	Thiru V. Sankaran, IAS Chairman, and Managing Director, Agro-Industries Corporation Ltd., Madras.	:	Member (from March 10, 1977)
16.	Tmt. Umayal Ramanathan Woman Social Worker Karaikudi	:	Member
17.	Thiru V. T. Titus Educationist, Madras	:	Member
18.	Dr. J. Thuljaram Rao Director, Sugarcane Breeding Institute, Coimbatore	:	Member
19.	Thiru S. A. Rajamanickam, MLC: Coimbatore		Member (upto April 20, 1976)
20.	T. R. Subramaniam Registrar	:	Member-Secretary

2. 2. 1. **Meetings of the Board of Management**: During the year under report the Board met four times on June 17, September 13, and December 23, 1976 and on March 14, 1977. The following were the important decisions taken by the Board:

1. Approved the Fifth Annual Report of the University, for the year 1975-76.

2. Approved the budget of the University for the year 1977-78 and of the Krishi Vigyan Kendra, Pondicherry, for the year 1976-77, the Board approved the Annual Accounts of the University for the year 1973-74 and 1974-75 and the University Provident Fund Rules.

3. Approved the starting of a Fisheries College at Tuticorin from the academic year 1977-78.

4. Approved the starting of a Krishi Vigyan Kendra near Tiruchirapalli by name 'Kumara Perumal Farm Science Centre'.

5. Approved the reservation of 18% of posts for the Scheduled Castes and Scheduled Tribes candidates at the first level of recruitment for the technical and non-technical posts.

6. Accepted in principle the premature retirement of University employees and appointed sub-committees to implement this decision. The Board also decided that such of the transferred employees in the University who do not possess the minimum qualifications prescribed by the ICAR/ University for the respective technical posts be retired on the completion of 55 years of age.

7. Accepted the creation of a Pension Fund in the University

8. Sanctioned construction of several buildings for hostel, laboratories and classrooms, farm and livestock buildings and staff quarters of the various centres including the Livestock Research Station recently transferred to the University from the State Government.

9. Permitted handing over of the new Extension Building near the Main Campus to Deputy Director of Agriculture, Coimbatore, in exchange of all the State Government offices and Laboratories located within the campus of the University.

10. Approved the conferring of degrees on the candidates who had passed out from the TNAU at the Fifth Convocation.

11. Approved the reduction of admission strength of the first year B. Sc. (Ag.) course of the TNAU by 20 numbers.

12. Accepted the reservation of 3% of seats for candidates from Southern States on reciprocal basis.

13. Approved the introduction of trimester system of education in the Veterinary College, Madras, for the B. V. Sc., M. V. Sc., and Ph. D. courses commencing from the academic year 1977-78.

14. Approved the introduction of Ph. D. degree programme in (a) Parasitology, (b) Poultry Science and (c) Micro-biology in the Veterinary College Madras, commencing from the academic year 1977-78

2. 3. **Academic Council:**

Chairman :

Vice - Chancellor — Dr. G. Rangaswami

Members :

Secretary to Government Agriculture Department	Thiru R. Natarajan, IAS Special Secretary to Government, Agriculture Department (upto June 27, 1976)
	Thiru H. M. Singh, IAS Secretary to Government, Agriculture Department (from July 1, 1976 to July 9, 1976)
	Thiru K. Venkatesan, IAS Secretary to Government, Agriculture Department (from July 10, 1976)
Deans of Colleges	Dr. C. V. Govindaswamy, Dean Agricultural College and Research Institute, Madurai
	Dr. V. N. Madhava Rao, Dean Agricultural College and Research Institute, Coimbatore
	Prof. C. R. Shanmugam, Dean College of Agricultural Engineering, Coimbatore
	Dr. D. Raj, Dean Faculty of Basic Sciences and Humanities, Coimbatore
	Dr. V. Rathnasabapathy, Dean Veterinary College, Madras
Director of Research	Dr. Y. B. Morachan, Director of Research
Director of Extension Education	Dr. S. Jayaraj, Director of Extension Education

Six members amongst the Heads of Departments to be nominated by the Vice-Chancellor	1.	Dr. K. K. Krishnamoorthy, Professor and Head of the Department of Soil Science and Agricultural Chemistry, Coimbatore
	2.	Dr. V. Rajagopalan, Professor and Head of the Department of Agricultural Economics, Coimbatore
	3.	Dr. P. Chandrasekaran, Professor and Head of the Department of Forage Crops, Coimbatore
	4.	Prof K. R. Swaminathan, Senior Research Engineer, College of Agricultural Engineering, Coimbatore
	5.	Prof. S. Kondas, Professor and Head of the Department of Forestry, Coimbatore
	6.	Dr M. Narayanan Kutty, Professor and Head of the Department of Fisheries, Coimbatore
Three members having special knowledge of practical experience in different aspects of Agriculture to be nominated by the Vice-Chancellor	1.	Dr. C. N. Sambandam, Dean, Faculty of Agriculture, Annamalai University
	2.	Dr. V. C. Kolandaiswamy, Director of Technical Education, Madras
	3.	Dr. A. Gnanam, Professor of Plant Sciences, Department of Biological Sciences, Madurai University
Secretary		Dr. T. R. Subramaniam, Registrar

2. 3. 1. **Meetings of the Academic Council:** The Academic Council met twice during the year under report and the following important decisions were taken:

1. Approved the new courses in Agricultural Production Programme.

2. Approved the syllabus for the Fifth and Final year B. E. (Ag.) degree programme.

3. Approved the transfer of the Statistics Wing from the Faculty of Agriculture to the Faculty of Basic Sciences and Humanities.

4. Approved the creation of Department of Forage Crops in the Faculty of Agriculture.

5. Approved the syllabus for the Post-Graduate Diploma Course in Agricultural Business Management.

6. Recommended the reduction in admission strength of B. Sc. (Ag.) degree programme in the University.

7. Approved the recognition of certain Research centres of the University to carry out Research work by the Post-Graduate scholars.

8. Approved certain modifications in rules for evaluating students performance in the trimester system of teaching.

2. 4. **Board of Studies** : The Boards of Studies in Agriculture, Agricultural Engineering and Basic Sciences and Humanities constituted during the previous years continued during the period under report. The Board of Studies in Veterinary and Animal Sciences was reconstituted with effect from January 20, 1977.

Each Board of Studies consists of the following members :

1. Dean of the Faculty — Chairman
2. Other Deans in the Faculty
3. Heads of Departments in the Faculty
4. All Professors in the Faculty
5. Two elected representatives from among the Associate Professors, Assistant Professors and Instructors

2. 4. 1. **Faculty of Agriculture** :

Elected Members

1. Dr. V. Mariappan,
Associate Professor of Plant Pathology,
Agricultural College and Research Institute,
Coimbatore

2. Dr. P. Kandaswamy,
Associate Professor of Soil Science and
Agricultural Chemistry,
Agricultural College and Research Institute,
Madurai

3. Dr. M. Gopalan,
(formerly) Assistant Professor of
Agricultural Entomology,
Agricultural College and Research Institute,
Madurai (upto April 13, 1976)

4. Thiru S. Thamburaj,
Assistant Horticulturist,
Horticultural Research Station,
Periyakulam

5. Thiru V. Thandapani,
Instructor in Agricultural Botany,
Agricultural College and Research Institute,
Madurai

6. Thiru M. Subramanian,
(formerly) Instructor in Agricultural Botany,
Agricultural College and Research Institute,
Coimbatore (upto February 13, 1977)

Dr. S. N. Rao, Principal, Agricultural College, Tirupathi and Dr.K.Krishnamurthy, Professor of Agronomy, University of Agricultural Sciences, Bangalore nominated by the Vice-Chancellor as Members of Board of Studies of the Faculty of Agriculture for a three year term continued to be members during the year.

2 4 2. **Faculty of Agricultural Engineering :**

Elected Members

1. Thiru G. Devadason,
(formerly) Agricultural Engineer,
College of Agricultural Engineering,
Coimbatore (upto August 4, 1976)

2. Thiru S. Subramanian,
(formerly) Associate Professor of Soil
and water Conservation,
College of Agricultural Engineering,
Coimbatore (upto August 8, 1976)

3. Thiru M. Balasubramaniam,
   Assistant Professor of Agricultural Processing,
   College of Agricultural Engineering,
   Coimbatore

4. Thiru C. T. Devadas,
   Assistant Professor of Agricultural Processing,
   Coimbatore

5. Thiru L. Narayanan,
   (formerly) Junior Engineer,
   Zonal Research Centre,
   College of Agricultural Engineering,
   Coimbatore (upto May 27, 1976)

6. Thiru N. C. Vijayaraghavan,
   (formerly) Junior Engineer,
   Zonal Research Centre,
   College of Agricultural Engineering,
   Coimbatore (upto April 13, 1976)

Dr. R. Lal, Dean, College of Agricultural Engineering, Bhuvaneswar and Thiru K. C. Chaturbhujanathiah, Principal (in-charge) Agricultural Engineering Institute, Raichur nominated by the Vice-Chancellor as Members of Board of Studies of the Faculty of Agricultural Engineering for a three year term continued to be members during the year.

2. 4. 3. **Faculty of Basic Sciences and Humanities:**

Elected Members

1. Dr. S. Gopalakrishnan,
   Associate Professor of Plant Physiology,
   Coimbatore

2. Dr. S. Sadasivam,
   Associate Professor of Biochemistry,
   Coimbatore

3. Thiru L.S. Kandaswamy,
   Assistant Professor of Tamil,
   Coimbatore

4. Thiru S. Subramaniam,
   Assistant Professor of Psychology,
   Coimbatore

Co. 3 Redgram, Co. 9 Lab-Lab, MDU. 1 Chillies and Co. 2 Amaranthus, were released at the time of the Pongal Festival. Several other promising pre-release varieties are under intensive district trials. In order to evolve suitable location specific package of practices for major crops of the State, the University Co-ordinated Research Project for irrigated lands was set up in 1976 and the same has been further strengthened during this year. The results from this project are expected to bring out the potentialities and economics of crop production in different agro-climatic regions of the State, in a continuing manner involving the use of newer crop varieties which are to be evolved from time to time. Several studies to economise the use of irrigation water have been made and utilizing the results demonstration plots are now laid out for the benefit of the farmers. The advantages of having mixed fodder crops such as maize and cow-pea in maximising fodder yield with low cost has been brought out by the studies made by the newly formed Department of Forage Crops. Studies of the Departments of Food Technology, Forestry, Fisheries, Seed Technology and Biology have also yielded certain new information of value in support of integrated farming practices. The research activities of the Veterinary College, Madras and the attached Research Stations are yet to be re-organized and brought under the problem-oriented, project-based pattern of the University.

3. The Extension Education Programmes of the University have been further strengthened during the year. A Recording Studio for AIR programmes, under the Communication Centre, financed by the ICAR, is under construction. The Farm Advisory Council, the Farmers' Training Centres and the National Demonstration Scheme functioned in an increasingly effective manner to disseminate the knowledge gained through the research activities of the University. During the year about 500 Press Releases in the form of popular articles on different aspects of Agricultural Sciences were published in the newspapers, journals and periodicals. An Information Centre has been set up at the Main Campus of the University to help the visitors and the farming community.

4. The University hosted the Fiftysecond Annual Meeting of the Association of Indian Universities on January 17 and 18, 1977 and the Eighth Convention of the Indian Agricultural Universities Association on February 18, 19 and 20, 1977 at its main Campus at Coimbatore. Both of them were successfully conducted to the satisfaction of about 70 Vice-Chancellors of the Universities of India who attended the first and about 100 delegates consisting of Vice-Chancellors, Deans and Directors of the Agricultural Universities of India who attended the latter. These two major academic meets helped in inspiring the staff of the University in carrying out their duties and responsibilities.

5. The Madras Veterinary College and the four Animal Science Research Farms and two training centres attached to it were transferred

5. **Thiru P Muthukrishnan,**
Instructor in Microbiology,
Agricultural College and Research Institute
Madurai

6. Thiru B. Kumaravadivelu,
Instructor in English,
Coimbatore

Dr. V.S. Ramadoss, Head of the Department of Botany Shri Venkateswara Agricultural University, Tirupathi and Dr. S Krishnaswamy, Head of the Department of Biology, Madurai University, Madurai, nominated by the Vice-Chancellor as Members of Board of Studies of the Faculty of Basic Sciences and Humanities for a three year term continued to be members during the year.

2. 4. 4. **Faculty of Veterinary and Animal Sciences :**

Elected members

1. Dr. J.S. Moses,
Reader in Bacteriology,
Veterinary College, Madras

2. Dr. K M. Selvaraj,
Reader in Extension,
Veterinary College,
Madras

3. Dr P.A. Balu,
Lecturer in Animal Husbandry,
Veterinary College, Madras

4. Dr. J. Earnest,
Lecturer in Animal Husbandry,
Veterinary College, Madras

5. Dr. S. Balasundaram,
Assistant Lecturer in Parasitology,
Veterinary College, Madras

6. Dr. V. Sundararasu,
Assistant Lecturer in Poultry Sciences,
Veterinary College, Madras

Dr. R. D. Nanjiah, retired Director of Animal Husbandry, Bangalore and Dr. P. S. Rajulu, retired Dean Veterinary College, Tirupathi were nomi-

nated by the Vice-Chancellor as Members of the Board of Studies in the Faculty of Veterinary and Animal Sciences.

Meeting of the Board of Studies: The Board of Studies in the Faculty of Agriculture conducted two meetings and the Board of Studies in the Faculty of Agricultural Engineering conducted one meeting during the year.

The Board of Studies in the Faculty of Agriculture transacted the following items:

1. Recommended to the Academic Council the new course in Agricultural Production Programme to the Third Year standing B.Sc.(Ag.), B.Sc.(Hort.) and Final B.E (Ag.) students as an optional course.

2. Recommended the course "Soil Survey and Land Use" to the final year B.E. (Ag.) students.

3. Recommended to the Academic Council the syllabus for the Post-Graduate Diploma Course in Agricultural Business Management.

The Board of Studies in the Faculty of Agricultural Engineering recommended to the Academic Council the syllabus for the Fifth and Final year B.E. (Ag.) degree programme for approval.

2. 5. **Board of Examinations:**

The Board of Examinations met four times during the year under report The following decisions were taken:

1. Approved the question paper setters, internal and external exami ners for B.Sc. (Ag.), M.V.Sc. and B.V.Sc. examinations to be held durin April /May/June, 1977 and September/October December, 1977.

2. Reviewed, moderated and declared the results of the M.V.Sc., ar B.Sc. (Ag.) degree examinations held during April May/June, 1976 a September /October/December, 1976.

3. Approved the schemes of the University examinations for the B. (Ag.), M.V.Sc., and B.V.Sc. degree examinations to be held during April/M June, 1977.

2. 6. **Courses and Curricula:**

The trimester system of education is followed for the B. Sc. (Ag.), B (Hort.), B.E. (Ag.), M.Sc. (Ag.), M.Sc. (Environmental Biology), M (Plant Physiology) and Ph.D. degree programmes of the University.

The teaching and examinations under the traditional system

followed for the third and the final year B.Sc. (Ag.) students. In the Veterinary College, Madras, the courses and examinations were conducted under thetraditional system.

Under the traditional system eight candidates obtained Ph.D. degree during the year.

2. 7 **Student Admission:**

For admission to 222 seats in the first year B.Sc. (Ag.) class (142 at Agricultural College, Coimbatore and 80 at the Agricultural College, Madurai) there were 1980 applications. For 20 seats in the first year B.Sc. (Hort.) class, there were 316 applications. Similarly, for 50 seats in the first year B.E. (Ag.) class, there were 821 applications.

For Post-Graduate programme, for a total of 107 seats in M.Sc. (Ag.), 5 seats in each for M.Sc. (Environmental Biology) and M.Sc. (Plant Physiology) there were 612 applications. For 22 seats, in Ph.D. degree programme, there were 126 applications. For the newly started Post Graduate Diploma in Agricultural Business Management, against 10 seats, there were 29 applications.

The following Committees for the selection of candidates to the various Under-Graduate and Post-Graduate programmes were appointed by the Vice-Chancellor.

B. Sc. (Ag.)	Dr. C. V. Govindaswamy Dr. V. N. Madhava Rao Thiru J. H. S. Ponnayya
B. Sc. (Hort.)	Dr. C. V. Govindaswamy Dr. V. N. Madhava Rao Thiru J. H. S. Ponnayya
B. E. (Ag.)	Prof. C. R. Shanmugam Dr. Y. B. Morachan Thiru S. Jaganathan
M. Sc. (Ag.) Ph. D. and Diploma in Agricultural Business Management	Dr. V. N. Madhava Rao Dr. C. V. Govindaswamy Dr. T. R. Surabmaniam Respective Heads of Departments and Professors of the subject
M. Sc. (Env. Bio.)	Dr. D. Raj
M. Sc. (Pl. Physiology)	Dr. T. R. Subramaniam Respective Heads of Departments and Professors of the subject

The list of candidates recommended by the above Selection Committee for the various courses were approved by the Vice-Chancellor and the selected students admitted into the respective Colleges. The admissions were completed and classes commenced from August 28, 1976, for under-graduate classes and from August 3, 1976 for post-graduate classes.

2. 8 **University Examinations :**

The University Examinations for B. V. Sc. and M. V. Sc. degrees were held during April, 1976 and the results were published on June 16, 1976. The examinations for fifth and final B. V. Sc. Part II were held during June, 1976 and the results were published on July 22, 1976. The examinations for the B. Sc. (Ag.) degrees were held in May, 1976 and the results were published on June 16, 1976.

The University examinations for the supplementary students of B. V. Sc. M. V. Sc. and B. Sc. (Ag.) were held in September / October / November / December, 1976 and the results were published on October 27, 1976 and January 6, 1977.

2. 9. **Trimester system of education :**

The third batch of 85 M. Sc. (Ag.) students and four Ph. D. students successfully completed their degree programme during the year under report. The first batch of 201 B. Sc. (Ag.) and 18 B. Sc. (Hort.) students successfully completed their degree programmes under Trimester System during the year under report.

A Teaching Method Seminar was conducted at Coimbatore on November 18, 1976. The teaching staff of the Colleges at Coimbatore as well as the heads of Departments at Madurai participated in the seminar. The merits and advantages of this system, improvements to be made, rectification of defects, if any, and the relationship between the teacher and the students were discussed.

2. 10. **Research Council :**

The Research Council is constituted to make the policy decision on research in various faculties of the Colleges and research stations attached to the University. The Council is functioning from 1973 with the following members:

Chairman :	Vice-Chancellor	:	Dr. G. Rangaswami
Members :	Registrar	:	Dr. T. R. Subramaniam

Deans of Colleges	: Dr. V. N. Madhava Rao, Dean (Agriculture) Coimbatore Dr. C. V. Govindaswamy, Dean Madurai Prof. C. R. Shanmugam, Dean (Engineering) College of Agricultural Engineering Coimbatore Dr. D. Raj, Dean (Basic Sciences and Humanities) Coimbatore
Director of Extension Education	: Dr. S. Jayaraj
Director of Agriculture	: Thiru A. Venkataraman, IAS
Director of Animal Husbandry	: Thiru L. M. Menezes, IAS
Director of Fisheries	: Thiru R. Nagarajan, IAS
Chief conservator of Forests	: Thiru K. A. Bhoja Shetty, IFS
Dean (Veterinary) Madras	: Dr. V. Rathnasabapathy

Three Members were nominated by the Vice-Chancellor in rotation from among the Heads of Departments from different disciplines of the University, from February 1, 1973 and their term expired by January 31, 1976.

1. Thiru A. Subramaniam, Professor and Head of the Department of Agricultural Botany, Coimbatore.
2. Dr. C. A. Gopalakrishnan, Professor and Head of the Department of Animal Husbandry, Coimbatore.
3. Thiru C. R. Venkataraman, Professor and Head of the Department of Soil Science and Agricultural Chemistry, Madurai.

Five experts to represent different disciplines from outside the University were nominated by the Pro-Chancellor on the recommendation of the Vice-Chancellor, in G. O. Ms. No. 664. Agriculture Department, dated 15.3.73.

1. Dr. Bertie A. D'Souza, Retired Dean and Director of Veterinary Education and Research, Veterinary College, Madras.
2. Dr. P. Kumaraswami, Director, Institute of Hydraulics and Hydrology, Poondi (upto July 18, 1976).

3. Thiru A. M. Mohammed Hussain, formerly Principal and Head of the Biological Research, Southern Forest Ranger's College and Research Institute, Coimbatore and now Conservator of Forests, Madurai (upto July 18, 1976)

4. Thiru C. Balasubramaniam, Retired Agricultural Meteorologist, Coimbatore

5. Dr. N. Parthasarathy, Retired F. A. O. Expert, Madras

Member-Secretary : Dr. Y. B. Morachan
Director of Research

The Vice-Chancellor nominated the following Heads of Departments in rotation from different disciplines of the University in place of the three, whose term expired by January 31, 1976

1. Dr. C. R. Muthukrishnan, Professor and Head of the Department of Horticulture, Coimbatore

2. Dr. K. R. Ramaswamy, Professor and Head of the Department of Seed Technology, Coimbatore

3. Thiru R. K. Sivanappan, Professor and Head of the Department of Soil and Water Conservation, College of Agricultural Engineering, Coimbatore

The Pro-Chancellor of the Tamil Nadu Agricultural University had approved the proposal of the Vice-Chancellor to nominate the following two experts from outside to serve in the Research Council for a term of three years from July 19, 1976. (G. O. Ms. No. 1422 Agri. Department dt: 19.7.76)

1. Thiru S. E. Anantharaman, Retired Managing Director, Agro - Industries Corporation, Madras-32 (to represent Agricultural Engineering)

2. Thiru T. Jayadev, Chief Conservator of Forests (Research and Development), Madras-6. (to represent Forestry)

The term of the following three experts, who were in the previous Research Council, were also extended for a further period of three years from the date of Government order, viz. July 19, 1976.

1. Dr. Bertie A. D' Souza, Retired Dean and Director of Veterinary Education and Research, Madras Veterinary College, Madras (to represent Animal Husbandry)

2. Dr. N. Parthasarathy, Retired F. A. O. Expert, Madras (to represent Plant Breeding and Genetics)

3. Thiru C. Balasubramaniam, Retired Agricultural Meteorologist, Coimbatore (to represent Agricultural Meteorology)

The Research Council met twice for its VII Meeting on August 5, 1976 and for its VIII Meeting on December 22, 1976 at the University Main Campus.

2. 11. **Extension Education Council :**

Chairman : Vice-Chancellor		Dr. G. Rangaswami
Members : Registrar		Dr. T. R. Subramaniam
	Deans of Colleges	Dr. V. N. Madhava Rao, Dean (Agriculture) Agricultural College and Research Institute, Coimbatore
		Dr. C. V. Govindaswamy, Dean Agricultural College and Research Institute, Madurai
		Prof. C. R. Shanmugam, Dean College of Agricultural Engineering, Coimbatore
		Dr. D. Raj, Dean (Basic Sciences and Humanities) Coimbatore
Director of Research		Dr. Y. B. Morachan
Director of Agriculture		Thiru A. Venkataraman, IAS
Director of Fisheries		Thiru R. Nagarajan, IAS
Director of Animal Husbandry		Thiru L. M. Menezes, IAS
Chief Conservator of Forests		Thiru K. A. Bhoja Shetty, IFS
Dean, Veterinary College, Madras		Dr. V. Rathnasabapathy

Five experts from outside the University nominated by the Pro-Chancellor on the recommendation of the Vice-Chancellor.

Thiru B. Kasthuri Rangan
Chairman
Tiruchirapalli Market Committee
Tiruchirapalli

Thiru A. K. D. Balarama Raja (Late)
Rajapalayam
Ramanathapuram District
(expired on January 28, 1977)

Thiru K. S. Vengu
Kottachi House
Koranad
Mayuram
Thanjavur District

Thiru W. P. A. R. Nagarajan
Planter
Pattiveeranpatti
Madurai District

Thiru T. V. Radhakrishnan
Manager
Shaw Wallace and Company Limited
Madras

Professors of Extension Education in Agricultural Colleges	Dr. A. John Knight Agricultural College and Research Institute, Coimbatore Thiru M. Muthiah Agricultural College and Research Institute, Madurai
Member-Secretary	Dr. S. Jayaraj Director of Extension Education

Two meetings of the Extension Education Council were held, one on 2nd August, 1976 and another on 22nd December, 1976 at Coimbatore. Various extension education activities of the University were discussed and improvements suggested.

2. 12. **Meetings, Seminars and Workshops:** During the year the University had the privilege of hosting and organising the following important meetings, seminars conventions and workshops.

(i) A month-long Summer Institute on "Insect Pathology in relation to Biological pest control" was held. It was inaugurated by Dr K. V. Srinivasan, Project Co-ordinator and Head, Indian Agricultural Reserach Institute, Coimbatore on June 7, 1976.

(ii) The Second National Seminar on Management of Agriculture was held from July 29 to 31, 1976. The Vice-Chancellor inaugurated the seminar.

(iii) A seminar on Integrated Rural Development was organised by the University on September 11-12, 1976. The Vice-Chancellor presided and delivered a welcome address. Dr. M.S. Swaminathan, Director-General, Indian Council of Agricultural Research, New Delhi, delivered the Key note address.

(iv) A seminar on the Teaching Method was presided by the Vice-Chancellor on November 18, 1976.

(v) A six-day Southern Regional Agricultural Information Communication Workshop was inaugurated on November 29, 1976 by the Vice-Chancellor. Dr. C.S.S. Rao, Joint Director (Farm Information), Government of India delivered the Key-note address.

(vi) The Sixth Annual Scientific Workers' Conference was held on December 21-22, 1976 at the Tamil Nadu Agricultural University Main Campus, Coimbatore. The Vice-Chancellor, Dr. G. Rangaswami, presided over the function. Dr. Ralph W. Cummings, Director, International Crops Research Institute for the Semi-Arid and Tropics (ICRISAT), Hyderabad inaugurated the conference on December 21, 1976, and the group discussions followed thereafter. The plenary session was held on December 22, 1976 under the Chairmanship of the Vice-Chancellor. About 500 delegates comprising the Officers of the Department of Agriculture, Animal Husbandry, Fisheries, Forestry of the State Government, Staff members of the Tamil Nadu Agricultural University, Coimbatore, Agricultural College and Research Institute, Madurai, Research Stations and ICAR Schemes of the University in moffusal stations and Staff members of Veterinary College, Madras, besides delegates from outside the State attended both the inaugural and plenary sessions.

(vii) The Department of Forage Crops was inaugurated by Hon. A.C. George, Union Minister of State for Civil Supplies and Co-operation, on January 9, 1977 and the Vice-Chancellor presided over the function.

(viii) A four day seminar on Soil and Water Conservation Technology was inaugurated by the Vice-Chancellor on February 7, 1977.

(ix) The 52nd Annual Meeting of the Association of Indian Universities was inaugurated by Hon. Shri C. Subramaniam, Union Finance Minister on January 17, 1977. Eightysix participants including Vice-Chancellors, Directors of deemed Universities and their representatives attended the meeting. Prof. Satish Chandra, UGC Chairman released the Souvenir of TNAU, brought out on the occasion and a book "Question bank on Zoology" prepared by the AIU. Dr. G. Rangaswami, Vice-Chancellor welcomed the gathering. Dr. S.M. Singh Suman, Vice-Chancellor, Vikram University and President of the Association delivered the presidential address. The seminar on "Role of Universities in Integrated Development", and "Youth Activities in Universities" were held on January 17 and 18, 1977.

(x) The VIII Annual Convention of Indian Agricultural Universities Association was inaugurated by Dr. O. P. Gautam, Deputy Director General (Education), Indian Council of Agricultural Research, New Delhi, on February 18, 1977. Dr. G. Rangaswami, President of the Association and Vice-

Chancellor of Tamil Nadu Agricultural University delivered the presidential address. The seminars on "Self Improvement of Agricultural Universities", "New Courses and Curricula", "Fundamental Research in Agricultural Universities" and 'Integrated Rural Development' were held on February 18-20, 1977.

Visitors A large number of dignitaries from foreign countries and from places outside the State visited the University during the period under report. A list of important visitors is given in Appendix I.

2. 13. **Visit of Staff members to Foreign Countries** : Thiruvalargal V. Meenakshisundaram, C Ramaswamy and B. Natarajan left for United States of America in 1976, for advanced studies in Michigan State University, University of Minnesota and Wisconsin University, respectively under Ford Foundation Grant.

2. 14. **Campus Development Plans**: The following amenities were provided:

2. 14. 1 **Coimbatore Main Campus**:

1. A building for the College of Agricultural Engineering
2. A building for the Faculty of Basic Sciences and Humanities
3. Hostel blocks for College of Agricultural Engineering (3 blocks completed)
4. Fish ponds for the Department of Fisheries
5. A building for Horticultural Department
6. A building for the University Library
7. Sports pavilion
8. Gymnasium
9. Post-graduate students hostel and dining hall
10. Staff quarters six blocks of six flats each
11. New basket ball court

2. 14. 2 **Madurai Campus**:

1. A Dispensary building
2. Staff quarters
3. A building for Staff club

2. 14. 3 **Horticultural Research Station, Yercaud**:

1. A laboratory building

2. A Check Dam and farm roads

3. Three Instructors quarters

2. 14. 4 **Horticultural Research Station, Periakulam:**

1. Office building
2. Store room and godown
3. Additional staff quarters

2. 14. 5. **Agricultural Research Station, Bhavanisagar:**

1. Instructors quarters
2. Fish Ponds

2. 14. 6. **Krishi Vigyan Kendra, Pondicherry:**

Farm House hostel and dining hall

2. 14. 7. **Livestock Research Station, Kattupakkam:**

Animal sheds and vehicle sheds

2. 15. **Vice-Chancellor's Activities:** The Vice-Chancellor was actively associated with the following Associations, Committees, Academic bodies, Advisory Committees and Educational activities during the period:

He was elected as the Founder President of the Tamil Nadu Academy of Sciences and is continuing in this capacity for the second year. He is an Honorary Commandant N. C. C. at the Tamil Nadu Agricultural University and Member of Tamil Nadu State Advisory Committee of the N. C. C; President, Madras Agricultural Students Union; President of the Indian Society of Agricultural Chemists, Allahabad; Fellow of the Indian Academy of Horticultural Sciences, Bangalore; Chairman of the Research Co-ordination Committee of the Central Silk Board, Bombay; Editor-in-Chief, Indian Journal of Sericulture, Member of the Current Science Association, Bangalore; Member of the Society of Biological Chemists (India); Member of the General Body, Governing Body, Research Society and Standing Finance Committee, Indian Council of Agricultural Research; Member, International Foundation for Sciences, Stockholm, Sweden; Member of the National Science Education Foundation, New Delhi; Member of the Advisory Committee of Vice-Chancellors, University Grants Commission, New Delhi; President of the Indian Agricultural Universities Association; Member of the Board of Management of the Indian Agricultural Research Institute, New Delhi. He is also made a member of the Senate and Syndicate of the Gandhigram Rural Institute-a deemed University, Gandhigram

During the year under report the Vice - Chancellor was on tour to (i) Honolulu. Hawaii and Taiwan to attend a two week International Workshop on Implementing Public Programmes in Agriculture at the East-West Centre, (ii) He attended the second Biennial Conference of the Asian Association of Agricultural Colleges and Universities at the Seoul National University, Suweon, South Korea. He presented a paper on 'Programme for Small Farmers in Indian Agricultural Universities' at the Conference. (iii) Recently Vice - Chancellor, Dr. G. Rangaswami has been appointed as a Member of the Joint Advisory Committee to advise the Directors - General, Food and Agricultural Organisation, United Nations Educational, Scientific and Cultural Organisation and International Labour Organisation on the planning and execution of programmes of Agricultural Education, Science and Training as well as Rural Employment, for a period of four years.

The Vice - Chancellor took part in several functions organised by the students and staff of the Agricultural Colleges at Coimbatore and Madurai and at the Veterinary College, Madras. The Vice-Chancellor took active part in several scientific meetings, farmers meets and college and school functions in and around Coimbatore during the year. He was also on the All India Radio on several occasions to broadcast his views on several aspects of Agriculture and Education. The Vice-Chancellor toured different parts of the State, visiting Agricultural Research Stations and taking part in several academic programmes, functions and meetings organised by the farmers.

3. TEACHING

3.1. AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE.

The Agricultural College and Research Institute, Coimbatore continued to offer B. Sc. (Ag.), B. Sc. (Hort.), M. Sc. (Ag.) and Ph. D. courses under Trimester System. Dr V. N. Madhava Rao, continued to hold the post of Dean from Feb. 2, 1976 to Feb. 28, 1977. Dr. Y. B. Morachan, Director of Research was in additional charge for a period of 30 days from Feb 28, 1977 to March 30, 1977.

Admission: The College reopened on July 19, 1976 for the second, third and final year B. Sc. (Ag.) and B. Sc. (Hort.) classes. The classes for the senior Post-Graduate students commenced on June 21, 1976.

The classes for the junior Post-Graduate students commenced on Aug. 3, 1976 under the Trimester System. The I B. Sc. (Ag.) and I B. Sc. (Hort.) students were admitted on Aug. 23, 1976. The number of students admitted in the I Year B. Sc. (Ag.) was 141 and I B. Sc. (Hort.) 17. The strength of students during the year in different classes was as follows: I year B. Sc. (Ag.) 141; I year B. Sc. (Hort.) 17; II Year B. Sc. (Ag.) 139; II year B. Sc. (Hort.) 20; III Year B. Sc. (Ag.) 142; III Year B. Sc. (Hort.) 20; Final year B. Sc. (Ag.) 139; Final year B. Sc. (Hort.) 20. I Year M. Sc. (Ag.) full-time 78; part time 9; I year Ph. D. full-time 4; part-time 26; II year M. Sc.(Ag.) full-time 58; part-time 8; II Year Ph. D. full-time 2; part-time 15; III year M. Sc. (Ag.) part-time 26; III Year Ph. D. full-time 6; part-time 27; IV year Ph. D. all part-time 42; V Year Ph. D. all part-time 13.

Diploma Course in Agricultural Business Management - 10 full-time.

Examinations: The University Examinations for the third and final year B. Sc. (Ag.) students under old regulations were conducted during April 1976 and October 1976.

No. of candidates awarded Post Graduate Degree (April 1976 to March 1977).

	M. Sc. (Ag.)	Ph. D.
Agricultural Botany	10	1

Agronomy	13	4
Soil Science and Agricultural Chemistry	11	2
Agricultural Entomology	4	1
Plant Pathology	5	2
Horticulture	5	1
Agricultural Economics	11	2
Agricultural Extension	9	—
Seed Technology	5	—
Plant Physiology	2	
Veterinary Science	—	1

Tours : The Final B. Sc. (Ag.) students went on tour from Oct. 19-29, 1976 to Madras, Tiruppathi and Bangalore and visited Research Stations and gardens. The Final year B. Sc. (Hort.) students went on tour to Madras from Feb. 9 to 14, 1977 to visit various gardens. The III Year B Sc. (Ag.) students were taken on study tour to Agricultural Experiment Stations, Aduthurai, Kovilpatti and Madurai Agricultural College.

Scholarships : The details of scholarships awarded during 1976-77 are furnished below :

Name of the Scholarships	Under-Graduate	Post Graduate	Total
Merit Scholarships	32	9	41
Merit-cum-means Scholarships (Indian Council of Agricultural Research)	50	–	50
I. C. A. R. Junior Fellowships	—	62	62
I. C. A. R. Senior Fellowships	—	3	3
C. S. I. R. Fellowships	—	5	5
E. I. D. Parry Merit Scholarship	3	—	3
Lodge Concord Scholarship	3	—	3
Talent Search Scholarship	1	—	1
Church of South India Scholarship	1	—	1
National Loan Scholarship	30	—	30
National Merit Scholarship	13	—	13
Harijan Welfare Loan Scholarship	60	—	60
Pondy Merit Scholarship	8	—	8
Backward Classes Scholarship	256	17	273
Harijan Welfare Scholarship	56	4	60
Ciba Scholarship	—	1	1
Potash Company Scholarship	—	1	1
Bharath Pulverising Mills Scholarship	—	1	1
Southern Borax Scholarship	—	1	1

Students' Hostel

Dr. V. Rajagopalan, Professor and Head of the Department of Agricultural Economics continued as Warden of the University Hostel upto October 31, 1976. Thiru A. Subramaniam, Professor of Agricultural Botany joined as Warden on November 1, 1976. Thiru T. S. Manickam, Assistant Professor of Soil Science and Agricultural Chemistry continued as Deputy Warden (Administration and Accounts) upto October 31, 1976 when he was relieved by Dr. S. R. Subramanian, Assistant Professor of Agricultural Economics. Thiru R. Kulandaivelu, Assistant Professor of Agronomy continued as Deputy Warden (Canteen) upto October 31, 1976 and he was relieved by Dr. M. S. Venugopal, Assistant Professor of Entomology. Dr. S. Chelliah, Associate Professor of Entomology continued as Deputy Warden (Mess). Thiru V. S. Subramanian Assistant Professor of Agricultural Extension took charge as Deputy Warden (Stores) from November 1, 1976. Thiru Shanmugam, Assistant Professor of Agricultural Engineering continued as Deputy Warden (Agricultural Engineering College, Hostel).

There were 873 students at the beginning and 943 students at the end of the year. Ninetysix students were permitted to be day scholars during the year. Among them, there were four foreign students. There are 330 rooms in the Agricultural College Hostel and 54 rooms in the Agricultural Engineering Hostel. The construction of two units of the Engineering Hostel containing 36 rooms is nearing completion and will be occupied shortly. A new Post-Graduate Hostel to accommodate 200 students is under construction. The general health of the students continued to be normal and satisfactory. Dr. J. Appa Rao, Medical Officer of the University continued to attend on sick students of the Hostel in the University Hospital.

Students Club and Social Activities. Thiruvalargal M. Arunkumar, IV B. Sc. (Ag.), M. K. Ragupathy, V. B. E. (Ag.), and C. Soundararajan, IV B. Sc. (Ag.) were nominated as Club Sectetary, Joint Club-Secretary and Games Secretary, respectively, in the place of regular elections this year. The Independence Day was celebrated on August 15, 1976. Dr. G. Rangaswami, Vice-Chancellor took the salute of N. C. C. guard of honour and delivered the Independence day message. The Orientation day for freshers was celebrated on August 24, 1976. The inaugural function of the club activities for 1976-77 was held on October 11, 1976. Thiru S. Narasimhan, I. A. S., District Collector, delivered the inaugural address. Dr. V. N. Madhava Rao, Dean, Agricultural College and Research Institute, presided. The Childrens' Day was celebrated on November 14, 1976. Dr. D. Raj, Dean, Faculty of Basic Sciences and Humanities presided over the function. Thiru S. Thirumalaiappan, Special Officer, Coimbatore Municipality was the Chief Guest. The Dramatic Society of the club gave a drama performance on September 3 and 4, 1976, at Central Jail Auditorium for the benefit of Coimbatore District Women's Voluntary Service.

The Inter-Class dramatic competitions were held on December 16 and 17, 1976. Dr. V N. Madhava Rao. Dean, Agricultural College inaugurated the competition. Dr. D. Raj, Dean, College of Basic Sciences and Humanities presided over the function and distributed the awards to the winners.

The Hiking Society of the club with a contingent of 50 students visited Walayar Dam and Kurudimalai. The competitions for the best student athlete and best sports woman were conducted on November 20, 1976. Thiru S. Ramaswamy, IV B. Sc. (Ag.), Agricultural College, Coimbatote and Selvi Robert Asha Rajine, V B. V. Sc. Madras Veterinary College, Madras were adjudged as the 'Best Student Athlete' and the 'Best Sports Woman', respectively. The Inter-Collegiate debate (Tamil Nadu Agricultural University) was held on December 4, 1976 to select 'The Best Student Orator' of the University and Thiru M. Srinivasan, IV B. Sc. (Ag.) was selected as 'The Best Student Orator' for Chief Minister's prize. The Inter-Collegiate debate for P. D. Karunakar Cup (English) and Dr. Parthasarathy Cup (Tamil) was held on March 4, 1977. Dr. V. Rajagopalan presided over the function and distributed the awards to the winners.

The Republic Day was celebrated on January 26, 1977. Dr. G. Rangaswami, Vice-Chancellor took the salute of N. C. C. march past and delivered the Republic day message. The Annual Day sports was held on December 22,1976. The Inter-Agriculture sports for MASU Cup was also held on the same day. Competitors from Agricultural College, Madurai, Faculty of Agriculture, Annamalai University, Madras Veterinary College and University Main Campus competed for it. The MASU Cup for the total aggregate was retained by University Main Campus by securing thirty two points. Dr. G. Rangaswami, Vice-Chancellor presided over the function. Thiru R. L. Handa, Deputy Inspector General of Police, Coimbatore was the Chief Guest of the day. Mrs. Sneh Handa distributed the prizes to the winners.

Vice-Chancellor Dr. G. Rangaswami Cup Hockey tournament was inaugurated on Jan. 21, 1977 by Thiru T. S. Panchapakesan, Superintendent of Police, Coimbatore at the University Main Campus. Dr. G. Rangaswami, Vice-Chencellor presided over the function on the final day on Jan. 23, 1977 when Mrs. Jayalakshmi Rangaswami, distributed the awards to the winners. Thiru M. Chengappa of University of Agricultural Sciences, Bangalore and Thiru V. G. Prabhakaran of Agricultural College, Coimbatore shared the best Players award of the tournament. The University of Agricultural Sciences, Bangalore and Agricultural University, Coimbatore became winners and runners up of the tournament, respectively. The Inter-Collegiate Hockey tournament was conducted in the Main Campus from Oct. 12 to 14, 1976. The College Hockey team claimed runners up position. The College Badminton team also became runners-up in the Inter-Collegiate Badminton tournament held at Government Arts College, Coimbatore. The College Foot-Ball team became

the runners-up in the Inter-collegiate Foot-Ball tournament held at the Main Campus on Feb. 22, 1976. The Kalaimani Memorial Foot-Ball tournament was conducted from Feb. 23 to 26, 1977 at the University Main Campus. The Coimbatore Medical College claimed the trophy beating Agricultural University Main Campus team. Thiru B. Hiralal IV B. E. (Ag.) College of Agricultural Engineering was given the 'Best player' award of the tournament. Prof. C. R. Shanmugam, Dean, College of Agricultural Engineering presided over the function and distributed the awards to the winners. The University Hockey team participated in the Inter-University Hockey tournament held at Mysore from Dec. 26, 1976. The team beat Kerala University and Nagpur University and reached quarter finals of the tournament. The University Badminton team participated in the Inter-University Badminton tournament held at Annamalai University from Dec. 25, 1976. The team beat Poona Universiry and reached the quarter finals of the tournament. The newly laid Basket Ball Court was inaugurated on March 8, 1977 by Dr. G. Rangaswami, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore. An Exhibition Basket Ball match was played between main campus and Y. M. C. A. Coimbatore.

National Cadet Corps: The National Cadet Corps consists of one company strength of 100 cadets, recruited from the college of Agriculture and college of Agricultural Engineering. As per the training programme 120 periods of parades were conducted in foot drill, arms drill, weapon training and map reading. Twenty-two cadets attended the annual training camp at Salem for a period of 12 days from Dec. 22, 1976 to Jan. 2, 1977. Thirty four cadets appeared for the 'B' and 'C' Certificate examinations. The company Senior Under-Officer S. Kamaraj was posted as the Senior Under-Officer of 4 (TN) Bn. N. C. C. Coimbatore. Capt. P. K. Rangiah continued to be the Officer in charge of the N. C. C. The cadets participated in the ceremonial parades conducted on August 15, 1976 and January 26, 1977. The Vice-Chancellor and Honorary Colonel of Tamil Nadu Agricultural University hoisted the National flag and took the salute on both occasions. A guard of Honour was presented to His Excellency Mohanlal Sukhadia, Governor of Tamil Nadu on Dec. 2[illegible], 1976 in connection with the convocation of Tamil Nadu Agricultural University, Coimbatore.

The National Service Scheme : This scheme started functioning in Tamil Nadu Agricultural University from December 2, 1975. In the University there are three units, with a strength of hundred students in each, attached to (1) College of Agricultural Engineering, Coimbatore (2) Agricultural College, Coimbatore and (3) Agricultural College, Madurai. There are three programme officers for the three units of the university. The Project Co-ordinator with the help of local panchayat members fixed one acre for the construction of 72 houses for Harijans in the adapted village, viz., Vedapatti. With the help of the two units of N. S. S. volunteers the area was surveyed. The volunteers from College of Agricultural Engineering drew the plan for the construction of houses

and worked out the cost of buildings. The N. S. S. volunteers contributed to the building work by means of 'Shramadhan'. They levelled the area as it was having undulating topography. Every Sunday by 6 A. M., the volunteers went to the Vedapatti village and did the "Shramadan" till late in the evening. The volunteers from College of Agricultural Engineering procured the materials like timber, bricks etc., at a reasonable price. The Bank sanctioned loan for 72 houses at Rs 1200/. All the 109 volunteers by means of "Shramadhan" alone contributed nearly 25% of the value equivalent to Rs 21,600/. Finally, the students constructed a storage tank for storing drinking water. The villagers and Harijans were very cooperative for completing the construction of the houses. The Vice-Chancellor of the Tamil Nadu Agricultural University, the Block Development Officer, the Panchayat Board President, the Bank Manager from the Bank of Baroda visited the area and appreciated the services of the young and energetic volunteers of N. S. S. for doing this fruitful service. A gravel road ½ km length and 10 metre width costing nearly Rs. 5000 - was formed by the Coimbatore N. S. S. Units.

In Madras, an unprecedented and heavy downpour of rainfall during the middle of December caused havoc, thus rendering 10,000 families homeless. Immediately the Vice Chancellor of Tamil Nadu Agricultural University, issued on appeal for liberal contribution of clothes and other articles for the affected people. The N. S. S volunteers went round the city and collected nearly 3000 old clothes. The clothes were handed over to the Chief Commissioner for Drought Relief, Madras for distribution. In this connection, staff and students also contributed Rs. 44,639 which was handed over in two instalments to the Governor of Tamil Nadu.

The Small Savings Scheme drive was initiated by the N. S. S. volunteers by approaching the farmers door-to-door in the adopted village and they succeeded in enrolling 50 members for the small savings scheme and 20 members for the Compulsory Time Deposit Scheme. Under Prime Minister's 20 point programme, 25 N. S. S. volunteers attended the Anti-Dowry Padayatra organised by the National Youth Forum and Directorate of Field Publicity, Government of India. In order to preserve the ancient monuments, N. S. S. students worked in clearing and renovating the 1000 year old Jain Temple situated 60 miles away from Coimbatore.

University N. S. S volunteers from College of Agricultural Engineering attended to the repairs of 15 power sprayers, ten rocker type sprayers, 12 dusters, 7 mould board ploughs and 15 country ploughs to the value of Rs. 1250/-. Five thousand saplings of Casuarina and Eucalyptus were planted in Vedapatti village especially on the road side, around the ponds and also in the school premises. N. S. S. volunteers assisted in controlling bed bugs in Government Hospitals. They sprayed 10 litres of gammexene in both men and women surgical wards.

Library : During the year 2958 books, 604 periodicals, 4826 issues of the periodicals, 527 bulletins and 42 thesis were added to the library. The books were classified and catalogued properly and arranged in the shelves. 3561 register cards, 2958 subject cards and 4437 author cards, were prepared and filed in the catalogue cabinet. In all 3561 book cards and 3561 tracing cards were also written and inserted in the books. Totally 18,078 cards were prepared and filed in the card cabinet. During the year 2958 new documents were classified and 756 titles were reclassified and recatalogued.

The Library received 745 periodicals out of which 604 were subscribed and 141 periodicals received as gratis. Twenty journals were deleted from the subscription list and 32 new journals were added and 603 periodicals were bound and added into the stack of the library. A total number of 49,150 persons visited the library and they consulted 2,46,915 books and periodicals during the year under report. In all 67,709 books and bound volumes of periodicals were issued on loan to the members. The out side research stations of the University were facilitated to get loan of books from the library. Fiftyfive books and periodicals were issued to the research stations during the year under report. The bindery was started during the month of December, 1976 with one special binder, one ordinary binder and helper; 1136 books, 2?6 periodicals and 155 publications were bound and 21 maps were mounted.

The library has published 'List of Periodicals', 'List of dissertations' and 'List of Back Volumes' for the use of its readers. During the year, the Library Committee approved publication of two monthly issues, namely APNI (Agricultural Press News Index) and READ (Recent Additions). During the year the reprographic section reproduced 2523 copies and earned Rs 1261.50 for reproduction of the materials. It was decided to index the articles appeared in the various journals received by the library appointing students under the scheme of 'Earn While Learn'. Ten students were given training to continue this work in the first phase. The work is in progress.

3. 2 AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, MADURAI

The Agricultural College and Research Institute, Madurai is engaged in teaching, research and extension education. The Institution offers B. Sc. (Ag. and M. Sc. (Ag.) courses under the trimester system of education.

Dr. C. V. Govindaswamy continued to be the Dean of the Institution. There are ten departments under the Faculty of Agriculture and four under the Faculty of Basic Sciences and Humanities. Each department is headed by a Professor or Associate Professor except the Departments of Languages and Social Sciences. The Dean is assisted by an Assistant Comptroller in office administration and a Warden and two Deputy Wardens in hostel administra-

tion. The Vice-President of the Students' Club and the various Staff Advisors assisted the Dean and Ex officio President of the Students' Club in the various extra-curricular activities.

Admission : The classes for the second, third and final year B. Sc. (Ag.) courses commenced on July 20, 1976. For the first B. Sc. (Ag.), classes commenced on Aug. 25, 1976 The Post-Graduate sessions commenced on Aug. 3, 1976 for the first year M. Sc. (Ag.) and on July 1, 1976 for the second M. Sc. (Ag.).

The number of students in the various classes studied during 1976-77 were as follows : First B. Sc. (Ag.) 77, Second B. Sc. (Ag.) 80. Third B. Sc. (Ag.) 72, Final B. Sc. (Ag.) 79, First M. Sc. (Ag.) 24 and Second M. Sc. (Ag.) 29 in all totalling 361.

Practical Training : The undergraduate students of second and third year classes underwent training in field practicals. The third year students were assigned individual plots and all the agricultural operations were carried out by students themselves.

Educational Tours : The III Year B. Sc (Ag.) students were taken on study tour to Agricultural Experiment Stations, Aduthurai, Cuddalore and Annamalai University. The Final Year students went on tour to Madras, Bangalore and Mysore to study the different aspects of Agriculture and Animal Husbandry.

National Cadet Corps : The National Cadet Corps Unit A/3 and B/6 Company of the College is attached to 7 (Tamil Nadu) National Cadet Corps, Madurai. The present strength of the company is 54 cadets, consisting of first, second and third B. Sc. (Ag.) classes As per the syllabus, training in foot drill, weapons training, field craft, map reading and first aid was imparted for 120 periods, each of 40 minutes duration. The officer-in-charge - Thiru S. Subramanian, attended the Pre-Commission training for the period of three months from April 26, 1975 to July 24, 1975 at Kamptee (Nagpur) and qualified to the rank of 2/Lieutenant; Seventeen cadets and N. C. C. Officer of this college attended the combined annual training camp at Usilampatti for a period of 12 days from November 19 to 21, 1976. Five cadets of this company donated blood to the blood bank during the camp. Twenty four cadets of this college appeared for the 'B' certificate Examination. The Republic day parade was conducted on January 26, 1977 and Dr. C. V. Govindaswamy, Dean took the salute.

N. S. S. Activities : The National Service Scheme is functioning from Feb. 11, 1976. The 100 N. S. S. volunteers have spent about 3880 man hours during the period. Thirumohur village has been selected under the village adoption programme. The function was

inaugurated by the Collector of Madurai and Dean, Agricultural College, Madurai presided over the function on September 18, 1976. The Madurai N.S.S. Unit laid at Thirumohur village 100 metre length and 5 metre width of an approach road to the Harijan colony, 200 metre length and 5 metre width of an approach road to the cremation ground from the main road and a pucka embankment of earthern wall for a distance of 50 metres. The value of the above works came to Rs. 2000/-. It did good work by clearing and renovating the temple monuments at Yanamalai near the Agricultural College, Madurai. Every Saturdays, ten volunteers assist the railway staff in checking ticketless travellers during peak hours in the evenings. This also makes the students as well as fellow travellers, to feel the importance of discipline and help in increasing the National revenue. The volunteers have themselves engaged in different activities viz. conducting night school, adult education programme, kitchen garden programme, afforestation and tree planting, drive against ticketless travel, temple cleaning, publicity on small savings, family planning, blood donation, drive against dowry system etc.

Students' Club Activities: The activities of the students' club commenced during the academic year 1976-77 with the nomination of Thiru N. Selvaraju, IV B.Sc. (Ag.) and N. David Daniel Selvaraj, IV B.Sc. (Ag.) as the Club Secretary and Games Secretary respectively. The Stadium cum Swimming pool was declared open for the use of the students on June 30, 1976 by Dr. G. Rangaswami, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore. The Independence Day was celebrated on August 15, 1976. Dr. C. V. Govindaswamy, Dean, Agricultural College and Research Institute, Madurai took the salute and delivered the Independence day message.

The college teams participated in the Madurai District cricket, hockey and foot-ball tournaments. The College ground was the venue for the Madurai University A Zone Volley Ball tournament. Thiruvalargal N. David Daniel Selvaraj and B. Palaniswamy IV B.Sc (Ag.) students have been selected to represent the Madurai District Junior Hockey team which participated in the Inter-District Union Hockey team tournaments held at Coimbatore. Thiruvalargal N David Daniel Selvaraj, K. T. Murugadoss, V. Prabakar and G. Mohamed Yasin were selected for Tamil Nadu Agricultural University Hockey Team which participated in the South Zone— Inter-Universities Hockey Tournaments held at Mysore. The College foot-ball team participated in the G. D. Naidu foot-ball tournament conducted by the Tamil Nadu Polytechnic, Madurai and reached finals. Thiru M. Deivendran secured the second position in Pro-Chancellor's prize for the best student athlete at Tamil Nadu Agricultural University Main Campus, Coimbatore. Fifteen students have participated in Inter-Collegiate

sports meet conducted by Rotary Club of Madurai West and secured large number of prizes. They have also participated in Annamalai University External open Athletic meet at Chidambaram. Thiru A. Bryn Green Anand, I.B.Sc. (Ag.) student won the individual championship, Thiru N. Mathialagan, III B.Sc. (Ag.) student secured first place in 200 M. dash in the Madras Agricultural Students' Union Annual day sports held at Tamil Nadu Agricultural University campus, Coimbatore.

A number of students participated in various debating competitions, oratorial contests, quiz programmes, essay competitions in English and Tamil conducted by the City Colleges and other Institutions. A batch of ten students participated in the Anti-Dowry Seminar conducted by the Y. W. C. A Madurai.

Students' Hostel: Thiru C. R. Venkataramanan, Professor and Head, Department of Soil Science and Agricultural Chemistry continued to be the warden of the Hostels. Dr. M. Rangarajan, Associate professor of Microbiology and Dr. M. Gopalan, Associate Professor of Entomology continued as Deputy Wardens. They were assisted by two Junior Assistants in the hostels.

There were 311 students staying in the hostel during the year, in two blocks for under-graduates and one for post-graduate students. The general health of the students was quite satisfactory. Adequate medical attention was provided by the part-time medical officer of the College.

Scholarships: The details of scholarships awarded for the year 1976-77 are furnished below:

Name of the scholarship	Under-graduate	Post-graduate	Total
Backward class Scholarship	115	6	121
Scheduled caste Scholarship	33	2	35
National Merit Scholarship	6	–	6
National Loan Scholarship	6	–	6
Pondicherry State Scholarship	3	3	6
Denotified Tribe Scholarship	3	-	3
State Agricultural Merit Scholarship	3	–	3
I. C. A. R. Scholarship	22	4	26
Aspee foundation Scholarship	–	1	1
Pyrites Phosphates and Chemicals Ltd. Scholarship	–	1	1
Harijan Welfare Loan Scholarship	29	1	30

3. 3. **College of Agricultural Engineering, Coimbatore.**

The College of Agricultural Engineering, the first of its kind in the Southern part of India, was started by the Tamil Nadu Agricultural University during the academic year 1972-73. The College offers a five year course of study leading to B E (Ag.) degree under trimester system of teaching. The fifth year of the course is now running, along with the other four i.e I, II, III and IV years of the course. Professor C. R. Shanmugham continued to be the Dean of the College of Agricultural Engineering.

Admission: Forty nine students were admitted to the I B. E. (Ag.) course during 1976-77. The first year course commenced on August 23, 1976 and the second, third and fourth year and final B.E. (Ag.) courses on July 19, 1976. The strength of the students during the year were 49, 49, 50, 50 and 39 in I, II, III, IV and final year respectively.

Examinations: Regular tests were conducted as per the regulations of the trimester system of teaching.

National Cadet Corps: Forty five students participated in the College National Cadet Corps.

Scholarships: In addition to Backward class and Harijan Welfare Department Scholarships of the State Government, the following scholarships are being availed of by the students.

Name of Scholarship	I	II	III	IV	V	Total
National Merit Scholarship Government of India	1	–	5	6	7	19
National Loan Scholarship	–	1	4	3	–	8
Gandhi Memorial Scholarship to Scheduled caste students	–	–			2	2
Loan scholarship to scheduled caste students	2	3	4	4	4	17
I C A R-Merit Scholarship	4	3	4	4	3	18
Rotary Club Scholarship	–	–	–	1	–	1
	7	7	17	18	16	65

Students' Hostel: The construction of buildings for two more hostel blocks of the College of Agricultural Engineering in addition to the one hostel block which was declared opened on September 1, 1976 has been

completed. Thirtynine students of the Final B.E. (Ag.) course, 50 students of the IV B.E. (Ag.) course and 13 students of III B.E. (Ag.) course are accommodated in the new hostel. The rest of the students of the B.E. (Ag.) course are accommodated along with the students of the Agricultural Faculty in the old hostel. The construction of buildings for the two more hostel blocks of the College of Agricultural Engineering is now under progress.

Extra curricular activities: One hundred students of the college are N. S. S. volunteers. Among them 54 students attended a special camping programme at Vedapatty, an adopted village and completed the construction of five houses for Harijans along with 20 other minor works.

Educational Tour: The final B. E. (Ag.) students were on practical training from June 17, 1976 to July 11, 1976 in the following organisations: (i) P. S. G. Industrial Institute, Coimbatore (ii) Assistant Agricultural Engineer (Mechanical), Coimbatore, (iii) Assistant Agricultural Engineer (Mechanical), Tiruppur, (iv) Tractor Workshop, Coimbatore, (v) Assistant Agricultural Engineer (Mechanical), Erode, (vi) Assistant Agricultural Engineer (Soil Conservation Scheme), Ooty and (vii) Assistant Agricultural Engineer (Soil Conservation Scheme), Coimbatore.

The Final B. E. (Ag.) students were taken on a study tour to (1) Central Food Technological Research Institute, Mysore, (2) Indo-Japanese Rice Farming Research Station, Mandya, (3) Agricultural Engineering Department, U.A.S. Hebbal and N. D. R. I. Bangalore, (4) Agricultural Engineering Institute, Raichur, (5) Dry Farming Research Station, and Oilseeds Technology Institute Anantapur. The IV B. E. (Ag.) students were taken on a study tour to Chengam, Tiruvannamalai, Madras, Tiruvarur, Melur, Madurai and Koilpatti.

3. 4. COLLEGE OF BASIC SCIENCES AND HUMANITIES, COIMBATORE

The Faculty of Basic Sciences and Humanities, Coimbatore, commenced functioning from September 1, 1975 as a constituent unit of Tamil Nadu Agricultural University.

Dr. D. Raj, continued to be the Dean of this Faculty. The faculty consists of Departments of Biology, Biochemistry, Plant Physiology, Physical Science, Social Science, Tamil, English and Fishery Science. Departments of Tamil and English, bifurcated from the erstwhile Department of Languages, started functioning with effect from December 3, 1976. This faculty offers a number of courses, besides undertaking a number of relevant research projects-both fundamental and applied, in close collaboration with the Faculties of Agriculture and Agricultural Engineering. This faculty has been offering post-graduate degree programmes in M. Sc. (Environmental Biology) since 1975, and in M. Sc (Plant Physiology) since 1976.

Admission: Five students were admitted to the M. Sc. (Environmental Biology) course, and four to the M. Sc. (Plant Physiology) course during the academic year 1976-77. Regular classes commenced from August 3, 1976 for the first year and from June 21, 1976 for the second year M. Sc. students.

Examinations : Regular tests were conducted as per the regulations of the trimester system of teaching.

3. 5. VETERINARY COLLEGE, MADRAS

The Veterinary College, Madras started in the year 1903 is now engaged in teaching, research and extension education. It has become a constituent unit of the Tamil Nadu Agricultural University from December 1, 1976. The College offers B. V. Sc., M. V. Sc., degree courses.

Dr. V. Rathnasabapathy is the Dean of the College. There are 26 departments in the College. The Dean is assisted by an Administrative Officer in office administration, a Senior Accounts Officer for Accounts, and Secretary, Research Council for research and other technical matters, Resident Veterinary Officer for general up keep of the campus and a Warden and three Assistant Wardens in Hostel administration The Vice-President of the Students Association and the Sports Secretary assisted the Dean, in the various extra curricular activities.

Admission : The classes for the second to final year B. V. Sc., July batch commenced on July 1, 1976 and for the October batch on October 19, 1976.

The following are the details of the number of students on roll, year-wise : I B. V. Sc. 194; II B. V. Sc. 110; III B. V. Sc. 145; IV B. V. Sc. 140; Final B. V. Sc. 205; I M. V. Sc. 24; and II M. V. Sc. 26.

Examinations : The percentage of passes in the Final B. V. Sc. and M. V. Sc. examinations are given below :

Course	No. of students appeared	Number passed	Percentage pass
Final B. V. Sc.			
Part I (Old Regulations)	3	2	66.6
Final B. V. Sc.			
Part I (Integrated Regulations)	92	62	67.4
June 1976			
Final B. V. Sc.			
Part I (Old Regulations)	4	3	75

Final B. V. Sc.			
Part II (Integrated Regulation)	97	69	71.1
I M. V. Sc.	30	17	57
II M. V. Sc.	29	25	84

Practical Farm Training: The students of I, II, III and IV B. V. Sc. degree classes have undergone practical farm training for 45 days during April - May at Livestock Research Station, Hosur, District Livestock Farm, Orathanad and District Livestock Farm, Pudukottai, respectively.

Tours: The Students of V and Final B. V. Sc. degree classes have undertaken an All-India study tour to various places in India for a period of 30 days, viz., July batch in April-May 1976 and October batch in October 1976.

National Cadet Corps: Seventy cadets have been enrolled in N.C.C. during the year. Promise Parade was conducted on the Independence Day, August 15, 1976, when the Dean administered the oath to the cadets. Eleven cadets attended the Annual Training Camp held at Pallavaram from December 26 to January 6. The Republic Day ceremonial parade was conducted on January 26, 1977, when the Associate Dean took the salute.

Students' Club and Social activities: The College Association was inaugurated on August 5, 1976 by Thiru K. Venkatesan, IAS, Secretary for Agriculture, Dr. V. Rathnasabapathy, Dean, presided. The College Hockey team won all the matches played in the league tournament conducted by the Madras Collegiate Association. Thiruvalargal D.G. Selvakumar, V B.V.Sc., D. Premkumar, IV B.V.Sc. and N. Punniamoorthy, III B.V.Sc. represented the Inter-University Hockey tournaments held at Mysore. Thiruvalargal S. Nayaranamoorthy, K. Rajarukmanngathan and N. Santhanakrishnan were selected to represent the Tamil Nadu Agricultural University Ball Badminton tournaments held at Chidambaram during January 1977. Thiru K.J. Oldy, V B.V.Sc. secured a prize in long jump at the Inter Collegiate sports meet conducted by the Madras Agricultural Students Union.

Scholarships: The details of scholarships awarded are as follows:

Name of Scholarship	Under Graduate	Post Graduate	Total
Backward Classes Scholarship	244	1	245
Harijan Welfare Scholarship	70	—	70
Harijan Welfare Loan scholarship	26	—	26
Backward Classes Loan Scholarship	3	—	3
National Loan Scholarship	4	—	4
National Scholarship	2	—	2
Ex-Servicemen Scholarship	4	—	4
College Scholarship	7	—	7
I.C.A.R. Scholarship	25	3	28

Students' Hostel: Dr. R. D. Michael, Professor of Hygiene, was the Warden of the Hostel till Dec. 31, 1976. Dr. S. Ravindra Nair is incharge of the post of Warden from Jan. 1, 1977. Dr. R. Anandan was acting as Assis tant Warden upto July 15. 1976 and Dr. V. Ramaswamy, M.V.Sc. Assistant Lecturer has taken charge from July 16, 1976. There were 519 students in the Hostel during the year. The health of the inmates was good and satisfactory. Dr. A Radhakrishnan, was the visiting doctor from July 1976.

Library: During the year under report. 152 books were added to the Library. The number of current periodicals subscribed was 175 (Foreign 136, Indian 39). The number of books issued on loan were 4174, and the number of bound volumes of Journals issued were 475. In all 14,140 persons visited the Library and 42,000 books were consulted in the Library, 9 Journals were received on exchange basis with 'Cheiron' published by Research Council, Madras Veterinary College. The Korestat copier is in constant use and 2,484 pages of reprints from scientific journals were taken and supplied to staff and students, with the aid of this equipment.

Extension Education: Attached to the college there is an Extension Education Section which, besides offering the required courses to the B. V. Sc. students is also carrying out certain field extension programmes. The chief ones are Farmers' Advisory Service, pertaining to poultry, dairy, etc.

Farmers' Training Courses, Orathanad A training course in livestock production, of three months duration, for the benefit of farmers is being offered since January 23, 1972 and so far a total of 544 progressive farmers have been trained. During 1976-77 in all 81 farmers were trained at this centre.

Livestock Assistants Training Centre, Hosur: This Centre imparts instruction in Veterinary Science and Animal Husbandry and prepares candidates for being appointed as Livestock Assistants in State Government service. The duration of course is 11 months of which 8½ months spent on practical training and 2 months in hospital at Veterinary College, Madras. During 1976-77, 100 students from Tamil Nadu and two from Pondicherry State were trained, 61 candidates came out successfully during September 1976 and another batch of 30 candidates admitted during November 1976 are undergoing the training.

3. 6. KRISHI VIGYAN KENDRA, PONDICHERRY

The Krishi Vigyan Kendra at Pandicherry continued to make rapid progress in meeting the objectives of its establishment. The Kendra is an unique type of institution, multi-faculty in nature comprising training as well as research activities. The aim of the Kendra which is the first of its kind in the country is to provide training for farmers, young school drop-outs with farm

background and extension workers to improve crop production, animal husbandry, dairying, farm forestry, home science, etc Training of persons with agricultural background and with middle level of education and also technicians and semi skilled persons in agricultural vocations are also undertaken in the insititution. Simultaneously research projects that are problem oriented to solve the needs of Pondicherry region and to cater the needs of coastal region are also under progress. During the year the following training activities have been carried out.

Training Activities

1. **Tractor Training**: A training for the ITI qualified youths for a period of three months in driving and maintenance of tractor and power tiller was arranged with the financial assistance from Director of Industries, Pondicherry. A total of 33 candidates in four batches from Pondicherry and Karaikal underwent the training during this year.

2. **Fruit and vegetable preservation and nutrition requirements**: A training programme for three days for the Grama Sevikas and Mukkya Sevikas of the Pondicherry State was arranged in collaboration with the Food Technology Department of Tamil Nadu Agricultural University, Coimbatore. Eighteen candidates underwent the training.

3. **Training for Youth**: Twenty youths in two batches from Nehru Yuvak Kendra were given training on rice production and agricultural tools and power tiller for three days. A batch of 25 youths from Youth Mandals of Pondicherry region were given a training for two days on rice and vegetable and also on fish culture in ponds. A three day practical on farm training programme on construction of ponds and growing fishes was conducted for a batch of 19 youths from Calve College, Pondicherry. The training was learning by doing.

4. **Functional Literacy Programme**: The teachers were trained on rice and vegetable production for three days under the functional literacy programme.

5. **Associate women workers training programme**: Fifty women were given one day farm training on rice growing and kitchen gardening. Discussion were conducted on the nutritional requirements and nutritive foods.

6. **Intensive rice production course**: Ten Village level workers were trained on the various intensive rice growing practices for a period of one month.

7. **Water management training**: A batch of five Extension Officers was imparted training for a period of 30 days on water management practices for rice, ragi and groundnut.

8. **Training programmes for commissioners of Panchayat Union:** A two day programme for the benefit of Commissioners of Communes was conducted at Pondicherry and at Karaikal on the latest methods of rice and vegetable production. Sixteen officers have underwent this training programme.

9. **Kharif programme on rice production:** In order to inform the farming people on the suitable rice varieties for kharif season for increased production, programmes were arranged for four selected villages. A total of 150 farmers were benefitted by the programme.

10. **Pre-season training programme** With a view of updating the Graduate Agricultural Extension Officers in improved varieties of crop plants and production techniques a pre-season training programme for rabi season for three days was organised in collaboration with the Department of Agriculture, Pondicherry. A total of 45 Extension Officers underwent the training.

11. **Fertilizer compaign for crops:** The importance of balanced fertilization for increasing the production of crop plants was informed to the ryots by arranging compaigns in five villages. A total of 200 farmers were benefitted by the campaign. This was done in collaboration with Madras Fertilizers.

12. **Vegetable campaign:** Discussions with farmers were arranged in nine villages in order to promote the recent high yielding varieties of vegetables and their production techniques for increasing the vegetable production in the Pondicherry region. A total of 218 farmers were benefitted by the campaign.

13. **Multiple cropping training programme:** Training programmes on multiple cropping patterns suitable for Pondicherry region were organised in eight villages and 172 farmers were benefitted.

14. **Plant protection training:** Training programmes were organised in three villages of major area on the plant protection measures on paddy to increase the rice production and 75 farmers were trained.

15. **Seminar and discussions:** One Rice Seminar and five farmers discussion group in five villages were organised and a total of 175 farmers were benefitted during kharif and rabi seasons.

16. **Farmers convenors meet :** Discussion on farm training were conducted for the farmers convenors from Pondicherry region for 3 days on rice, pulses and vegetable production. At Karaikal two meets were held, one for kharif and the other for rabi for the benefit of convenors. Discussion on fish culture in ponds was also conducted for the first time at Karaikal. A programme was conducted at Karaikal highlighting the performance of rice Rajarajan (Co. 40).

17. **One day training programmes**: One day discussion cum demonstration meets were conducted for the practising farmers on improved season specific rice varieties, vegetables, production methods and plant protection practices in nine villages. A total of 205 farmers were benefitted. This programme was carried in collaboration with the Farmers Training Centre, Pondicherry.

18. **Marginal Farmers and Agricultural Labourers Agency**: One day practical training was conducted for ten farmers of M.F.A.L. on demonstration of growing rice. Two batches (22 farmers) of farmers belonging to two irrigation societies were also given training on water use and water management practices for rice and ragi and also on maintenance of pumpsets.

19. **Collaboration**: In addition, The Krishi Vigyan Kendra is collaborating with the Farmers Training Centre, Multiple Cropping Programme of Pondicherry State, Marginal Farmers and Agricultural Labourers Agency, Vector Control Research of Indian Council of Medical Research and Jawaharlal Institute of Post-Graduate Medical Education and Research for supply of seeds and planting materials for test growing and also by rendering technical advisory service. Regular Farm Advisory work in co-ordination with the Project Agricultural Officer, Pondicherry is undertaken. Technical help in conducting adaptive trials and also in laying demonstration trials on varieties and improved practices is regularly being extended to the different units of the Department of Agriculture, Pondicherry.

3. 7. KUMARA PERUMAL FARM SCIENCE CENTRE, TRICHIRAPALLI

The Kumara perumal Farm Science Centre at Trichirapalli commenced functioning from March 1, 1977. An area of 50 acres of land on the Trichy-Madurai road has been taken over by the university, works on development of the land and preparation to create the physical facilities for the Centre have been initiated.

4. RESEARCH

4. A. Research work by the University staff:

Research activities of the scientists at Coimbatore and Madurai Campuses and at the various research stations and centres located in different agro-climatic regions have yielded fruitful results. During the year, the University released seven new crop varieties, developed the technology for different cropping systems, and for better utilisation of soil, water, nutrients and other inputs in crop production. Further, the research activities in the Research Stations in the State under Tamil Nadu Agricultural University have been strengthened by providing the needed physical and other facilities.

The Sixth Annual Scientific Workers' Conference was held on December 21-22, 1976 and this year, there was very good response from the State Departments of Agriculture, Animal Husbandry, Forestry, and Fisheries who deputed a larger number of senior staff than last year to attend the conference. At the Conference, the research findings were reviewed and based on the suggestions made, new projects were formulated and where necessary the older ones were revised. Currently 1224 projects are being implemented covering different branches of Agriculture, Horticulture, Animal Husbandry, Agricultural Engineering, Fisheries, Forestry, Food Technology, Basic Sciences and Humanities. Presently, there are 82 schemes financed by the Indian Council of Agricultural Research, Government of India and Private Agencies, and are being implemented at Agricultural College and Research Institute, Coimbatore and Madurai and 22 Research Stations and Centres distributed all over the State under the Tamil Nadu Agricultural University. Recently, four research stations attached to Veterinary College, Madras have been transferred to the University by the State Government. In order to stabilise and strengthen these research stations, several steps have been taken.

The progress of work under all the research projects was reviewed by the Vice-Chancellor along with the Director of Research and the respective Deans of Colleges, based on the results obtained and on the current needs, where necessary modifications, revisions, deletions and additions were made. The progress of research was also reviewed jointly by the Research and Extension Councils of the University. The Councils made several recommendations on the future line of research and they have been incorporated in the research programmes of the University.

The research findings from each of the completed projects have been transmitted to University Communication Centre, for processing and taking steps to disseminate the information to reach the beneficiaries.

Classification of the Research projects in the University

The projects have been numbered following a specific guide line indicated below:

R. 1 Series	Agricultural College and Research Institute and College of Agricultural Engineering, Coimbatore.
R. 2 Series	Agricultural College and Research Institute, Madurai.
R. 3 Series	Agricultural Research Station, Bhavanisagar.
R. 4 Series	Agricultural Research Station, Aliyarnagar.
R. 5 Series	Groundnut Research Station, Pollachi
R. 6 Series	Horticultural Research Station, Periakulam.
R. 7 Series	Horticultural Research Station, Kodaikanal.
R. 8 Series	Regional Research Station, Kaveripattinam.
R. 9 Series	ICAR Schemes at Aduthurai.
R. 10 Series	Regional Coconut Research Station, Veppankulam.
R. 11 Series	Regional Coconut Research Station. Coconut Wilt Disease Scheme, Muthupet.
R. 12 Series	Wetland Banana Research Station, Uyyakondanthirumalai.
R. 13 Series	Sugarcane Research Station, Cuddalore.
R. 14 Series	Cashew Research Station, Vriddhachalam.
R. 15 Series	ICAR Schemes at Tindivanam.
R. 16 Series	Castor Research Station, Salem.
R. 17 Series	ICAR Schemes at Kovilpatti.
R. 18 Series	ICAR Schemes at Srivilliputhur.
R. 19 Series	Krishi Vigyan Kendra, Pondicherry.
R. 20 Series	Horticultural Research Sub-Station, Thadiyankudisai.
R. 21 Series	Horticultural Research Station, Yercaud.
R. 22 Series	Forestry Research Station, Mettupalayam.
R. 23 Series	ICAR scheme at Coonoor.
R. 24 Series	ICAR scheme at Vaniyambadi.

The projects have been numbered in two categories, viz, fundamental projects under 101 to 200 series and field-oriented projects under 201 series and upward. The serial numbers of each project are prefixed with an abbreviation to indicate the departments concerned. The research activities of Veterinary College, Madras and the six research stations and centres are yet to be brought under a similar numbering system.

The results of research work carried out in the University during 1976-77 department-wise and project-wise are summarsied in the following pages. The names of project leaders and their associates for different projects are

given under each project title. The actual work on the project was carried out by the respective persons named under each project. The Dean of each College was responsible for supervision of the research activities carried out by the staff and post-graduate students of the respective Colleges. The Director of Research, besides being directly responsible for the research work carried out in the outlying Research Stations of the University was also the Chief-Co-ordinator of all the research activities in the University and in this regard he functions with direct responsibility to the Vice-Chancellor.

SUMMARY OF SALIENT FINDINGS

4. 1. CEREALS

4. 1. 1. **RICE:** One rice culture, TNAU. 13493, a derivative from the cross IR.8 x Co. 25 was found promising and released as strain Co. 40 (Rajarajan). This culture is capable of yielding 6 t/ha compared to 3 5 t/ha by Co. 25, i.e. an increase of 72 % over Co. 25. This is suitable for cultivation in *samba* (August-January) and *Thaladi* or *pishanam* (October-February) seasons. At Madurai, seven cultures have been identified suitable for cultivation under rainfed conditions. They recorded a grain yield ranging from 3.75 to 4.61 t/ha as against Vaigai recording 3.63 t/ha. In the trials conducted with 12 short and 10 medium duration varieties of rice at Bhavanisagar, Vaigai and Bhavani recorded the maximum yield of 5794 kg and 6602 kg/ha respectively. At Krishi Vigyan Kendra, Vaigai was found to be best suited for *sornavari* and *navarai* seasons followed by Thiruveni and ADT. 31. Among the selections evaluated, TNAU. 658 and 633 were found to be promising with a per day production of 71 and 74 kg/ha respectively.

At Kaveripattinam, in an yield trial conducted with 81 cultures of paddy, it was found that cultures IET. 2508, TKM. 6 mutant, IET. 8244, 5202 and 2501 were outstanding in their performance recording 3994 to 5025 kg/ha. Under Madurai condition, sowing of short duration paddy between 10th and 24th June recorded highest yield than earlier sowings.

The variety Vaigai planted at Coimbatore with a spacing of 15 x 10 cm gave a grain yield of 4680 kg/ha. Application of 60 kg N/ha half at planting, ¼th at tillering and ¼th at panicle initiation was superior to other splits. Application of Stomp (G) at 1.5 kg/ha combined with 120 kg/N/ha recorded a net income of Rs. 3994/-in summer season with IR. 20 rice. In *kharif* season 180 kg N/ha recorded the net income of Rs. 3617/ha. For direct sown rice the application of C. 288 at 0.5 kg a. i/ha gave a grain yield of 4412 kg which is 606 kg more over the farmers method of two hand weedings. At Coimbatore, *Azotobacter chroococcum* in combination with *Bacillus polymixa* and *Bacillus megatherium* along with 60 kg N/ha (50% of N dose) gave the maximum yield of 6555 kg/ha with variety RP-4-14. The trials in farmers' holdings on RP-4-14 variety of rice indicated that *Azotobacter* treatment with 50-75%

of fertilizer N gave higher yield of grains (7820 to 8230 kg/ha) over control (100% fertiliser N) giving 6750 kg/ha. In Soil Test Crop Response Scheme, a trial conducted at Bhavanisagar with Vaigai rice revealed that soil test recommendation based on Mitscherlich Bray equation (N, P_2O_5 and K_2O of 141, 25 and 25 kg/ha respectively) registered an yield increase of 66.3% over the control resulting in the saving of 44 kg N/ha.

The application of sevidol at 1.0 kg a. i/ha on 20th and 60th day after planting reduced the stem borer damage. Fenthion 0.1% and Parathion 0.025% spraying given on 35th and 45th day after planting reduced the nematode infection in the earhead stage and increased the yield. Application of carbofuran granules to the nursery at 1.0 kg a.i/ha on 15th day after sowing was helpful in postponing the application to 35th day in the main field. In the screening trial for the reaction of rice cultures to bacterial leaf blight conducted at Aduthurai, cultures IET. 5943, 6907 and 6139 showed resistant and IET. 6122, 2866 and 3285 were found to be moderately resistant. The cultures IR. 26, IR. 28, Bhavani, Ponni, Dawn, TNAU. 12848, 12901 and 14520 were moderately resistant to *Helminthosporium*.

4. 1. 2. **Sorghum**: One tall mutant of cholam Uch. V. 1 obtained from the dwarf variety CSV. 5 giving grain yield equal to CSV. 5 and 30% more straw yield was released as strain Co. 21. Under irrigated condition, it yields on an average, 4.2 t/ha and under rainfed 2.0 t/ha. The variety can be grown in all the three seasons, viz., irrigated summer season, early South-West monsoon season and late North-East monsoon season. In addition, two cholam varieties, Uch. V. 2 and Uch. V. 3 and one cholam hybrid Uch. H. 1 are found promising and are in district trials.

The varietal and spacing experiment conducted at Coimbatore showed that CS. 3541 recorded maximum yield of 4845 kg/ha. The spacing of 45 x 12 cm registered 5012 kg/ha and superior to other spacings. Transplanting of cholam reduced the grain yield by 25 to 30%. Intercropping of cholam, with lab-lab registered the highest grain yield of 7264 kg/ha with a net profit of Rs. 6031/ha as against pure crop of cholam, with a net profit of Rs. 6140/ha. Irrigating CSH. 5 cholam at 50% depletion of available moisture was found to be the best at Coimbatore. In areas of limited water supply, four irrigations at seedling, vegetative, flowering and grain formation stages in addition to sowing saved about 100 mm of water per hectare without reducing the yield very much. Spraying atrazine at 0.4 kg a. i./ha as pre-emergence in cholam is recommended. Under Kovilpatti condition the cholam crop should be kept weed free from 21 to 35th day of germination for getting maximum yield.

Band application of carbofuran 3G at sowing at the rate of 1.5 g/metre row would reduce the shoot fly damage by 46.3%. Dusting of either malathian 4% or phosalone 4% twice, one at the time of 50% head emer-

gence and the second a week later at 20-25 kg ha controls midge. Dusting BHC 10% was most effective against cholam whorl aphid.

4. 1. 3. **Cumbu** : One cumbu variety U. C. V. 1, developed from a Nigerian bulk, yields as an irrigated crop 2.1 t/ha compared to 1.7 t ha for NHB. 3. This variety matures in 90-95 days and is resistant to downy mildew. This variety was released as strain Co. 6. Also one hybrid, U. C. H. 4 has been identified as superior to the existing hybrid, KM. 1. Time of sowing experiment at Coimbatore showed that March and July sowings were found to give higher yields than other months. Transplanting of cumbu gave 2530 kg ha while direct sowing recorded 1868 kg/ha. Application of 50 kg N in two splits was found to be optimum for cumbu. The variety U.C.V. 1 showed only 10% incidence of ergot disease while HB. 3 recorded 80% incidence.

4. 1. 4. **Ragi** : Selection EC. 4849 recorded 32 q/ha which is 13% more than Co. 10 (28 q/ha). Transplanting ragi gave higer grain yield of 5817 kg/ha than direct sowing (5283 kg/ha). Transplanting involved additional expenditure of Rs. 150 ha but the duration in the main field was reduced by 10 days.

4. 1. 5. **Wheat** At Coimbatore, sowing the wheat (Kalyan Sona) crop by first week of November was found to be the best time and registered 21.74 q/ha. The economic dose of NPK was found to be 76 : 38 : 38 kg/ha. Application of fertiliser in two splits was found to be good.

4. 1. 6. **Panivaragu** The selection PV. 346 gave a higher yield of 16 q/ha as against 12 q/ha of Co.1, yield increase being 28%. PV.346 is under adaptive research trials.

4. 1. 7. **Tenai** : The selection S i. 76/4 which is resistant to rust recorded the highest grain yield of 35 q ha under irrigated condition, showing a significant increase of 66% over Co. 3.

4. 1. 8. **Varagu** : In the rainfed comparative yield trial, the short duration selection PS. 175, maturing in 120 days, yielded 42 q/ha compared to 18 q/ha by Co. 2 recording an increase of 132%. Another selection PS. 600 with still shorter duration gave 25% increased yield over Co. 2 in 105 days.

4. 2. PULSES

4. 2. 1. **Redgram** : S. 18, an induced mutant of redgram yields on an average of 12 and 14 q/ha under rainfed and irrigated conditions respectively. The mutant is a terminal cluster, determinant and photo-insensitive, high yielding variety maturing in 130 days. Compared to Co. 2, this mutant is resistant to root-rot and was released as strain Co. 3. Under rainfed condition at Coimbatore, the pure crop Co. 2 responded well to the application of 25 kg in each of N and P_2O_5/ha. The increase in grain yield was about 76% over

no fertiliser. The optimum spacing was found to be 45 x 20 cm (1.11 lakh plants/ha). Application of monocrotophos 0.04% or phosalone 0.07% or endosulfan 0.07% once at pod formation stage and again after 15 days effectively controlled the pod borers of redgram.

4. 2. 2. **Blackgram** : A short duration high yielding mutant 3 has yielded 13 q/ha compared to 10 q/ha of Co. 3 under irrigated condition. It gives 21% higher yield over Co. 3 and its per day productivity is 17.9 kg/ha whereas it is only 12.2 kg/ha in Co. 3. Ethrel spraying at 250 ppm increased the yield by 35%.

4. 2. 3. **Greengram** : Mutant 2 in greengram has recorded 9.1 q/ha as against 7-8 q/ha for Co. 3 with an increase of 18% in 90 days as a rainfed crop. Ethrel spraying at 150 ppm increased the yield by 18% over control.

4. 2. 4. **Cowpea** : PLS. 25 and PLS. 370, two early selections in grain type of cowpea, with non-trailing habit were in trials in the farmers' holding. Among vegetable types, culture Co.2/2 confirmed its superiority over Co. 2 giving a mean yield of 54 q/ha as compared to Co. 2 with 46 q/ha i. e., 18% increase over Co.2. Co.1 and C.152 were found to have high degree of resistance to the root-knot nematode.

4. 2. 5. **Lab-lab** : A short duration spontaneous bushy mutant maturing in 120 days possess very desirable qualities. It is also a high yielder, recording 7.5 t/ha (green pod) which is 40% more than Co. 8. It is photo-insensitive. It was released as strain Co. 9.

4. 2. 6. **Bengalgram** : One high yielding selection, PLS. 10 was tested in farmers' holding. On an average, it yielded 10.3 q/ha compared to 8.7 q/ha by Co. 1, the increase being 18%.

4. 3. OILSEEDS

4. 3. 1. **Groundnut**: Two high yielding mutants of groundnut 0.05-39.2 and 0.05-39.2.71 obtained from POL. 2 recorded 26 to 28% higher yield over POL. 2. A pureline selection *A. h.* 8188 yielded on an average 17% more than POL. 2. These two mutants and the selection have been forwarded for test in ryots' holdings. At Pondicherry, pre-release dormant bunch cultures *A. h.* 8253 and 8254 recorded 2.07 and 1.56 t/ha excelling TMV. 9 by 51.1 and 13.6% respectively. Both at Bhavanisagar and Tindivanam *A. h.* 8254 significantly outyielded TMV. 9. At Tindivanam, there was response to K_2O application and 75 kg of K_2O/ha was found to be optimum. Application of alachlor at 1.5 lit a.i/ha as pre-emergence spray in groundnut crop was found to control the weeds effectively. Mixed cropping trial on groundnut with sunflower under rainfed condition has revealed that sowing sunflower at 2 m spacing recorded maximum net profit of Rs. 1256/- per ha, as compared to groundnut alone

(Rs. 1128 -). One round of spraying with Nuvacron 0.05% at the time of red hairy caterpillar incidence gave a control of 96.46%. For the control of surulpoochi, two sprayings with Zolone 0.05% on 30th and 50th day after sowing were economical and effective with 81.49% decrease in incidence over control. Rust disease was controlled by application of dithane M. 45 at 1 kg/ha.

4. 3. 2. **Gingelly** : One culture S i. 1855/1 gave 13% higher yield over TMV. 3 recording 7.1 q/ha whereas the yield of TMV. 3 was only 6.3 q/ha. Closer row spacing of 20 cm and 30 cm gave significantly higher seed yield of 5.23 q/ha and 4.81 q/ha respectively as against 40 cm under rainfed condition. Mixed cropping of sesamum with redgram at 1 : 1 ratio gave significantly higher monetary return than pure crop. The increase in return was Rs. 444 - per hectare. Combined spraying of endosulfan or fenthion 0.2 kg/ha with dithane M. 45 0.2% or Miltax 0.25% at 40 and 60 days after sowing controlled major pests and diseases of sesamum.

4. 3. 3. **Sunflower** : An improved sunflower variety, EC. 101495 was tested for its yield and recorded 18.48 q/ha as against 15.05 q/ha by EC. 68413. The former is shorter in duration by a fortnight. Application of 50 kg N and 50 kg P_2O_5/ha gave the maximum yield of 12.59 q/ha with EC. 68413 variety under Coimbatore condition. Under rainfed condition application of 30 kg N and 30 kg P_2O_5/ha was found to be sufficient to get optimum yield.

4. 3. 4. **Castor** : A short duration mutant maturing in 90 days was obtained from SA. 2. This recorded 33% increased yield over SA. 2 recording 16 q/ha.

4. 3. 5. **Safflower** : Three pure line selections viz CTS. 7205, 7218 (Spiny) and 7403 (non spiny) in safflower were isolated and they have recorded increased yield of 16, 20 and 14% respectively over the control K. 1. Application of 20 kg N with a spacing of 45 x 15 cm was found to be optimum for getting maximum yield under rainfed condition. Safflower can be grown as mixed crop with bengalgram in paired rows to get maximum return.

4. 3. 6. **Coconut** : Planting coconut seedlings at a depth of 60 cm was found to be beneficial and superior to surface planting at Veppankulam. It recorded increased yield of 23% over surface planting. The flowering was earlier by 10 months under 60 cm. Drenching with 40 litres of Bordeaux mixture at quarterly intervals combined with irrigation during summer months reduced the severity of Thanjavur Wilt Disease to a considerable extent. The cost of each application works out to Rs. 6.50 per plant.

4. 4. FIBRE CROPS

4. 4. 1. **Cotton** : Two cultures ELS.380 and ELS.481 were found to be promising with higher yield and better ginning outturn than MCU. 5 suitable

ral oil enable the buds to break their rest period by 10 days earlier than control. *Least damage (46%) in transport was recorded in fruits packed in crates with* saw dust while maximum loss (86%) was observed in crates with paper shavings. Wrapping the fruits in polythene film of 150 guage was observed to be helpful in storage of apples upto 65 days without spoilage.

4.8.2 **Vegetables:** In tomato, the types LE. 368 and LE. 391 were found suitable for rainy season and 573 and LE. 574 to summer yielding 2 to 2.5 kg/plant as against 0.5 to 0.7 kg in Co.1 and Co. 2. Mutant Annanji tomato tried at Periyakulam recorded 30.5 t/ha while the local Annanji has produced only 20.8 t/ha. Seed quality and size of fruit are positively associated indicating thereby utmost care should be taken in selecting uniformly ripened normal size fruits for seed extraction. Extraction through acid method was found to enhance the seed quality and percentage of recovery of seeds.

Two promising selection SM. 2 and SM. 50 A in brinjal were found to be tolerant to root knot nematode in addition to heavy yields (20 to 25 t/ha) and high quality fruits. At Pondicherry, Punjab Chamkila and Pura Purple Long Brinjal recorded high yields (36.78 and 35.89 t/ha) over the local *Thengathittu* (20.89 t/ha). 35 days old seedlings were found to be optimum for transplanting to get maximum yield.

In bhendi, twelve resistant lines to yellow vein mosaic disease have been isolated from the crosses between Co. 1/Pusa Sawani x *Abelmoschus manihot.*

In chillies, the culture C. 4 (P) 247 was found to be promising and registered an increased yield of 25.8% and 12% over K. 1 and K. 2 respectively. At Periyakulam, application of 120 kg N/ha has produced highest mean dry pod yield. Chilli mutant known as culture 1 from Madurai recorded an yield of 1809 kg/ha as against 1507 and 1553 kg/ha recorded by K. 1 and K. 2 respectively. *Chilli mosaic disease was found to be controlled* by carbofuran applied twice at 20 kg/ha first in the nursery before sowing the seeds and again 15 days after transplanting in the main field.

An evaluation of amaranthus germplasm resulted in the Isolation of a promising selection A. 25 and was released as strain Co. 2. It yields about 10.78 t/ha whereas Co. 1 yields about 7.17 t/ha.

In pumpkin, a selection CM. 37-9 when tested showed its superiority in yield by recording 25.646 t/ha while Co. 1 yield 20.206 t/ha amounting to 26.8% increase over Co. 1.

Promising selection in bitter gourd, bottle gourd, ribbed gourd and ash gourd have been tested in yield trials. MC. 77 with 12.8 t/ha in bitter gourds, LS. 2 with 19.2 t/ha in bottle gourd, LA. 10 with 12.6 t/ha in ribbedgourd and BH. 34 with 40.0 t/ha in ash gourd outyielded the local varieties.

In radish, the medium duration selection R. 3. 13 yielded 47.9 t/ha under Kodaikanal condition. The roots are ready for harvest in 45 days. Long White radish variety recorded maximum yield of 54.416 t/ha under Thadiyankudisai condition and it was 49.2% higher than Pusa Rashmi (36.134 t/ha).

Manuring of Bonne Veile peas under irrigated condition with 160 kg P_2O_5 and 115 kg K_2O recorded seed yield of 810 kg/ha which was 49% higher than control at Kodaikanal.

In French beans application of 1% urea spray on 25th and 45th day after sowing gave increased yield of 47.425 t/ha of green pods and it was 18.3% higher than control at Kodaikanal.

For seed production in Cauliflower, the plants bolted without any special treatment after the formation of curds. The mean yield of seed/plant was 3 g.

4. 8. 3. **Tapioca**: Clone H 1 was found to yield 39.5 t/ha and it was 11.4% higher than local Malavella. Under Pondicherry condition erect planting of tapioca cutting was found to yield better than horizontal planting adopted locally. In a comparative trial at Kaveripattinam, M 7 tapioca recorded maximum yield of 28.7 t ha which was 192.5% higher over Musiri local. Irrigation given once in 20 days during the last 2 months has increased the starch content of tubers by 2%. Intercropping tapioca with onion has given additional income of Rs. 1036/- per ha without affecting the growth of tapioca.

4. 8. 4. **Plantation Crops**: Among the cashew germ plasm collection maintained at Vriddhachalam M.26/1 recorded maximum nuts of 4815 kg/ha as against 1 to 2 t/ha by local. Inarched plants recorded earlier bearing and more yield (5.87 kg of nuts/tree), than seedling plants (3.24 Kg of nuts/tree). Foliar application of 2. 4-D (5ppm) increased the fruit set and recorded 126% more yield than control. Cultural treatments like irrigation, manuring, interculture and plant protection enhanced the yield by 180% over control.

4. 8. 5. **Flowers**: In jasmine, clone 5 from Thimmapuram produced more flowers than the other and mean yield of 4.3 kg/plant as against 1.3 kg/plant of the local.

In rose, it was found that high density planting of Edward rose with 10,000 plants/ha recorded highest yield of flowers than wider spacing with 1666 plants/ha.

In tuberose, pre-soaking of seed bulbs in CCC at 5000 ppm enhanced the flower yield by 70.6% by registering 378.6 g of flowers/plant. Seed bulbs weight of 39 g registered 10% higher yield than bulbs of 6 g weight group.

Foliar application of 1% urea to crossandra at fortnightly intervals com-

mencing from the first month after planting showed an increase in yield of 35.5% over no manuring.

4. 8. 6. **Medicinal and Aromatic plants:** In pyrethrum, splits and seedlings can be profitably employed as planting material. Plants grown in partial shade gave more flowers.

In geranium basal cuttings rooted well at 1000 ppm of IAA which was superior to all other treatments. IBA at 200 ppm was best in inducing rooting in the middle and terminal cuttings. Application of Lasso 5.0 lit/ha suppressed the weeds but enhanced the growth of morphological characters and yield.

In mentha, stem with one leaf can be propagated quickly and easily. For active root growth the leaf which is the seat of photosynthetic activity and auxin synthesis in the plant, is essential.

4. 9. FOOD TECHNOLOGY

Guava juice drink with 15 per cent juice, 20 Brix and 0.25 per cent acidity has been found to be organoleptically good. Addition of citric acid during canning of mushroom (*pleurotus*) does not affect the texture and 0.25 per cent acidity gives a product light in colour with desirable flavour. Studies on the effect of conditioning of the whole Italian millet (*Setaria italica*) with different amounts of moisture before milling showed that equilibrating the grain with 2.5 per cent of extra water gave an optimum yield of flour with low fibre. Coating with oil or oil emulsion increased the shell life of eggs considerably at room temperature for three weeks.

4. 10. FORESTRY

Among eight tree species of *Acacia* tried at Bhavanisagar *A. planifrons* was the hardiest recording 96 per cent of establishment. There was lack of response for nitrogen and spacings tried in bamboo nursery. Cut bits of the rhizome chains of *Bambusa bambos* regenerated and the ability for regeneration was found to be positively associated with the weight of the cut bits. Moreover, the experiments indicated that bits of rhizome chains obtained from lesser than six months old seedlings failed to regenerate. The LD_{50} dose for seed treatment of the crop was found to be 16 Kr. Work on the Tree Improvement Programme in *Eucalyptus tereticornis* for the evolution of quick growing, high yielding strains was initiated. Biometrical observations on the existing variability and screening for trees of desirable types were made in plantations of different agro-climatic conditions.

4. 11. SEED TECHNOLOGY

Treating the fresh black pepper seeds with conc. H_2SO_4 (commercial grade) for less than a minute and slurry treating with Thiram 75% WP at 2 g

per kg of seed improve germination. For quick viability testing of cardamom and coffee seeds 0.5% aqueous solution of 2, 3, 5 triphenyl tetrazolium chloride salt was found useful. For obtaining high yield of quality seeds in Co. 21 sorghum, higher plant population (45 x 15 cm spacing) was found necessary. Application of 28 kg in each of N and P_2O_5/ha to Co. 6 *bajra* gave the highest yield of about 3100 kg/ha of quality seeds. For grading the seeds of this cultivar, a round perforated metal sieve of the specification 5/64" was found optimum.

In Co. 2 tomato for seed extraction, 35-40 day-old fruits should be used. Allowing only the first formed two flowers in the cluster to develop fruits enhanced the recovery of quality seeds by 8 per cent without reducing the over-all yield. Foliar application of cycocel (CCC) at 2000 ppm at early flowering increased the seed yield by 11% and seed recovery by 5%. For obtaining increased seed yield in 'Pusa Sawani' bhendi, spacing the plants at 60 x 20 cm was found optimum. Considering the yield and quality of seeds use of fruits from the first four pickings is recommended for seed extraction. In the small fruited cultivar of pumpkin mature fruits weighing less than 2.5 kg should not be used for seed extraction. For seed production in Co 1 bengalgram application of 20 kg in each of N, P_2O_5 and K_2O and spacing of 30 x 20 cm are recommended. For storing Co. 1 bengalgram seeds with high initial viability in paper-polythene laminated pouches for about 18 months, with minimum loss in viability under ambient temperature and relative humidity obtainable in places like Coimbatore, seed treatment with activated clay at 1 Kg and captan 75% WP at 75 g per 100 kg of seed was found essential.

For seed production in TMV. 3 gingelly sowing early in April was found to be the best followed by May sowing, considering the vigorous growth of the crop yield and quality of seeds. For maximising the yield of good quality seeds in sunflower EC. 68413, application of 60 kg in each of N and P_2O_5 and 30 kg of K_2O/ha was found to be the optimum.

For breaking dormancy in seeds of TMV. 1 and TMV. 10 groundnut, soaking the kernels in 0.5% aqueous solution of potassium nitrate for 16-24 hours was found effective. Pretreating the cardamom seeds with concentrated sulphuric acid (commercial grade) for 20 minutes, washing them thorougly to free the acid and subsequently treating them with a fungicide and sowing will hasten the germination by 15-20 days. In Panniyur-1 black pepper, only seeds from fresh berries which are dark red in colour are to be sown to secure germination exceeding 60 per cent. For extraction of good quality seeds in K 2 chilli only mature red fruits which are bigger in size should be used. For grading the seeds of this variety round perforated sieve of the specification 7/64" is recommended. For grading Co. 39 vaigai and cultures 633, 658 and 6202, oblong perforated metal sieve of the specification 12.7 (or) 19.0 x 1.8 mm was found to be the optimum.

4. 12. SOIL AND WATER CONSERVATION

Studies on drip irrigation on papaya conducted at Coimbatore revealed that drip irrigation requires 43.8 cm whereas surface method requires 153.70 cm. Water stress given to TKM.6 mutant paddy during vegetative, panicle formation and maturity period gave less yield.

4. 13. FARM MACHINERY

Solar plate collector made of aluminium was developed to harvest solar energy. This energy can be utilised to heat water during normal sunny days from 11 a. m. to 2 p. m. 180 litres of water can be heated upto 78°C and stored in the outlet tank over a day that will be available the next day morning for taking bath. The cost of solar plate collector works out to Rs. 4500/-. A power tiller operated paddy harvester has been developed. It covers an area of 0.7 ha/day and can be operated by single man and worked even in small paddy fields. The shattering loss of paddy is less than 1%. The cost of harvesting with the machine is Rs. 110/- per hectare as compared to Rs. 140/- for manual labour, resulting in a saving of 21.5%. The cost of unit is Rs. 3,500/- excluding the cost of power tiller.

Gobar gas plant developed in the department of Farm Machinery can be used in diesel engine and save fuel consumption. The diesel engine started with full diesel and the methane gas is let in by operating a valve through the nipple at the air inlet. The cost of nipple is only Rs. 5/-. It was tested on 5 H.P diesel engine and the saving ranged from 38 to 42 paise per hour of running the engine. A pilot paper plant was established to handle the various agro-wastes.

4. 14. AGRICULTURAL PROCESSING

For extracting fibre from mesta a machine has been developed. The outturn of this machine is 52 kg of wet fibre per hour. The cost of removing one quintal of wet ribbons, retting, washing, etc., works out to Rs. 19/-. The ribbons removed by machine require a less retting period (8 days) when compared to conventional method (18 days). The cost of processing mesta by machine works out to Rs. 380/- per hectare as against Rs. 560/- in conventional method. The cost of this machine is Rs. 2500/-.

4. 15. AGRICULTURAL STRUCTURES

The digested sludge obtained from the sewage gas plant is having more manurial value. To remove the unobjectionable gases like CO_2 and moisture in the methane gas, charcoal and sand filter was designed and this is functioning efficiently. To suit the need of rural community a chemical toilet was developed and this functioned efficiently. To

improve the hygienic conditions and also easy flowing of feeding material a conical feeder was developed. To reduce the cost of feeder a conical bamboo feeder lined with polythene sheet was developed and the cost reduced to 2/3 of the existing feeder. A portable on-farm channel using soil cement without sacrificing the strength, was developed. Estimation and design of poultry, cattle and pig sheds, were completed.

4. 16. BIOLOGY

Microbiology The soil application of granular insecticides, viz., disyston and phorate at 0.5 kg a.i./ha along with seed treatment with *Rhizobium* was found to stimulate nodulation and yield in Co. 2 blackgram.

The microorganisms involved in the fermentation of the batter for *idli* and *dosai* received from different sources indicated lot of variations in the bacterial populations in the batters. Population of *Lactobacillus* sp. in different batters varied considerably.

Among the various varieties of rice tested, the variety 'White kar' was best suited for *idli* and *dosai* batter whereas IR. 8, IR. 20, IR 22 and Ponni proved to be poor varieties for the microbial fermentation of the batter.

In sericulture, the performance of the mutant lines (29 lines) of Kalimpong A race of silkworm obtained through gamma irradiation were studied upto M 7 generation. The cocoon weight of the mutant lines ranged from 1.100 to 1.540 g while that of the parent lines (control) was 1.306 g. The percentage of shell weight ranged from 9.48 to 17.1 among the mutants while in control it was 8.96. The filament length of mutants ranged from 950 to 1100 m while that of control was 900 m. The renditta of the mutants varied from 6 to 9 while that of the control was 10.

The frequence of the honey bee visit to sunflower under different ecological conditions varied considerably. In an isolated patch of sunflower crop honey bee visit was more (1-52) whereas when sunflower crop is surrounded by various crops which are periodically sprayed or dusted with different insecticides as plant protection measure the honey bee visit was in the range of 1 to 28.

In tissue culture work, a procedure (Meristem tip culture) has been developed to obtain healthy chilli and tomato plants from shoot apical meristems. Meristems of tomato and chilli cultured on a modified medium of Murashighe and Skoog supplemented with NAA (0.19 mg/l), adenine (0.11 mg/l) and coconut milk (15% V/V), regenerated into normal plantlets (20-40%) within 25-30 days at 26°C, 60-75% relative humidity and exposed to fluorescent light (3200 lux, photoperiod 10 hr.).

In the anther culture a number of haploid plantlets were produced from the anthers of *Nicotiana tabacum*, *Petunia axillaris* and *Datura* sp. in modified Nitsch medium. Anthers of medicinal plants like *Tylophora asthmatica* formed callus tissue first in the modified Nitsch medium and then number of embryoids appeared from callus after two months.

Environmental pollution studies on particle pollutant from Chettinad Cement Factory, Puliyur, on various cultivated crops in the vicinity indicated lot of variations. The study of growth parameters in groundnut indicated that the specific leaf area, relative growth rate, crop growth rate, leaf area index, root nodule number and root nodule weight were considerably reduced due to cement dust pollution, when compared to non-polluted crop. The gynophore entry into the soil was prevented because of hardening of the soil due to cement dust deposition and the pod setting was reduced resulting in poor yield.

The Trichy Distillary effluents had drastically affected the germination of various seeds like maize, cholam, paddy, greengram and tomato. Even at 1:1 dilution of the effluent the germination of the seeds was reduced. The reduction in germination was due to high osmotic pressure (8.5 atmosphere) which was due to high sugar content (100 ppm/ml).

The effluents from various sago factories varied considerably in the microbial load; the bacterial and yeast flora were comparatively higher in all the effluent samples. The pH of the effluent samples ranged from 3.0 to 3.5 and this was due to the activities of butyric and acetic acid bacteria. The effluent water collected from different sago factories inhibited severely the growth of various crop plants like paddy, cholam, maize and sunflower. The shoot and root growth of the crop plants was drastically reduced when compared to normal irrigation water. Chlorination of the effluent waters at 50—200 ppm level in early stages of processing controlled the autofermentation by undesirable microflora and hence bad odour was removed.

4. 17. PHYSICAL SCIENCES

Biological value, digestibility and net protein utilization of TNAU. 658 when evaluated by rat feeding experiments, were found to be 88 4, 84.0 and 74.6% respectively. The examination of the nitrogen balance data showed that *Pleurotus sajor-caju* has considerable ability to fix atmospheric nitrogen, fixing 582 g of total nitrogen per 100 kg dry weight of paper. When the streptomycin resistance was transformed from the mutant to the wild strain of *Rhizobium* sp. the transformation frequency was found to be between 0.007 to 0.02 per cent.

The biochemical evaluation of the quality diet supplied in IV year B.Sc. (Ag.) and B.E. (Ag.) students' hostel messes showed slight deficiency in

calorific value and the diets were also found to be deficient in vitamins A, B_1 and C. Suitable suggestions were made to rectify the deficiencies. As tannins have an adverse effect on poultry birds, the wild legumes which were considered as protein substituents in the formulation of cheap poultry feed were analysed for their tannin content, and of the varieties tested, *Peltophorum ferrugineum* was found to contain the highest quantity of 3.5%. The cheap poultry feed already formulated was comparable to control feed in efficiency upto 5% substitution.

A study of selection indices for redgram has shown that the three characters viz., yield of plant, height of plant and spread of plant contribute to the maximum genetic gain.

4. 18. SOCIAL SCIENCES

A study was undertaken by the Department of Social Sciences on the socio-economic changes among cotton-growing families in Coimbatore district. High rate of adoption of improved agricultural practices and commercial outlook in agriculture were observed among the respondents. Farm house living, possession of modern items of furniture and household articles, use of synthetic dresses, etc., reflect their better living conditions. Economic motivation is predominant and scientific attitude is significant. Farm decisions are made by head of family. There is a shift in local leadership from tradition to formal. There is rise in marriage age of men and women. Radio, cinema and gramasevaks serve as effective means of communication for disseminating agricultural information to farmers. Head of family decides adoption of innovation. Value system is key to adoption and a study of value system is useful in understanding the mechanism of adoption process of innovation and its prediction. A study conducted among the students of Tamil Nadu Agricultural University, revealed that students from low socio-economic environment perform better under trimester system of education. A study of social factors influencing food habits among semi-urban people showed that food habits are formed on the basis of price of food grains, religious taboo for particular food, etc.

According to the study of socio-economic changes among banana cultivators in Madurai District, intergenerational educational mobility was observed among all sections of farmers; it was pronounced in families with marginal farms. Package of new agricultural practices usually go with adoption of new varieties. The sample farmers were cultivating only traditional varieties and changes have been least when compared to the cultivators of other crops both in terms of agricultural technology and their life-style.

4. 19. LANGUAGES

Communication by scientists and extension workers in Tamil for the

purpose of formal and non-formal education was analysed linguistically. It was found that only during the first 20 minutes of lecture, the reception and perception of a message was successful (60%) in class room teaching and in F. T. C. lectures As such, it is advisable to alternate lecture and discussion every 20 minutes. Further, it was found that the extension workers have to learn to use proverbs properly, and to form new proverbs using the existing structures. Analysis of farm broadcasts was also undertaken and a number of difficulties identified As a result of these studies, materials on Linguistic Treatment of Message (editing) for Communication have been gathered in a book-form, and a course on this title has been developed and offered to IV year Agricultural Extension Education students in collaboration with the Department of Agricultural Extension Education

From another study, it has been found that about 65 students (30%) admitted into the first year are very poor in English, of them 18 have studied PUC in Tamil medium. It was found necessary to develop new approaches in order to bring them to a certain basic level of proficiency in English, as otherwise, their over-all performance in other subjects will be highly affected.

A study of Sangam literature reveals that separate water tanks were built for storing and harvesting rain falls for agricultural practices; separate watchmen were appointed to look after the maintenance of these tanks. The dam walls were shaped in a semi circular form probably in relation to strain and stress of water stored in tanks and reservoirs.

A study relative to source of water management shows that in the days of Naick kings, fishing rights in tanks and lakes were leased and the income from the auction was set apart for constructing new water lakes. Separate committees called *'Eari variam'* were established to keep the water tanks in good repair and to look after the needs of irrigation facilities in all places; tax-free lands were assigned to protect the lakes in the name of *'Eari p-patti'*.

The study of dialectal variations and proverbs shows that forest lands were reclaimed for agricultural purpose. This process was called *Accu-p-potutal* or *'Accatittal'*. It is also understood that transplantation with large inter-spacing between clumps from nursery fields was in practice and it was known as *'Kalantu potutal'* and *ceruttu-p-potutal* for planting with close spacings.

Sociolinguistic knowledge is very essential for simple, effective, skillful communication. So, far extension workers it is essential to know the sociolinguistic patterns of the farming communities. By this study communication between extension workers and farming communities can be made effective. Having this in mind, a sociolinguistic study of dialectal variations, folk songs and proverb etc., among the farming communities have been studied. Farming communities of Madurai district say/muli/savalalan/for 'node' and eatable portions.

4. 20. FISHERY SCIENCE

A new multipurpose hatchery jar was designed using plastic sheet. The capacity of the jar is about 10 litres and can incubate 20-40000 fertilised eggs of carps at a time, saving lot of space and water. Fish production in small earthern ponds of 180 m² under composite fish culture revealed that the pond with fertilisation and feeding gave 2400 kg/ha/year. The cost of production of fish works out to Rs. 2.2/kg. The sewage effluents are fed into the fish ponds and reared at a density of 12,000/ha. The estimated production ranges from 6000 to 8000 kg/ha/year. The performance of silver carp was best, gaining over 2 kg in weight. Sewage fed fish culture is highly economical and remunerative since there is no recurring expenditure. The effeet of agro-chemicals on fresh water fishes were studied. It was found that zolone is the most toxic, lebacid the next and phosvel the least toxic. Lebacid 10 ppm solution kills 100% carp within 75 minutes but one day old solution has no lethal effect on carps. A simple demand feeder fabricated in the department was used for feeding fish with pelleted feed and was found to work well for carps and tilapia. A technique for cathetrisation and sampling of ova from live fish has been developed. Wild leguminous seeds were tested as feeding material for common carp and *Glyricidia* and *Delonix regia* gave conversion ratio of 9.7 and 9.6 respectively.

4. 21. ANIMAL HUSBANDRY

A feeding trial in large white yorkshire pigs with tapioca chips replacing maize at 100 percent level revealed that tapioca can be used instead of maize in swine ration and the cost of tapioca feed per kg (Rs. 1.07/kg) is cheaper than maize incorporated conventional feed (Rs. 1.36/kg).

Studies on actual cost of production of broiler at 8 weeks was worked out to Rs. 8.36. The feed cost forms major cost item being Rs. 3.88 followed by Rs. 2.55 as cost of day old broiler chicks. The percentage contribution of fixed cost to the total cost was 12.44%, whereas variable cost was 37.56% of the total cost of producing broiler.

Gobar gas slurry was incorporated in the poultry feed. The slurry incorporated food compared favourably with birds fed with conventional ration and maize was replaced to an extent of 10 per cent in the conventional feed by air dried gobar gas slurry. The cost of gobar gas slurry incorporated feed per kg was lesser than conventional feed per kg by 10 paise. Brewer's dried grain (beer waste) was evaluated as poultry feed. At five per cent level brewers' dried grains, there was maximum feed efficiency in broiler chicks. Spent tea dust can be incorporated at 5% level in chick mash without any adverse effect on the growth of the chicks. Studies on economic traits of broad breasted large white turkeys showed that average feed comsumption of turkeys upto 20

weeks of age was about 17.085 kgs at which their average weight was 4.5 kg. Their feed efficiency worked out to 1 : 3.796.

Skip a day feeding in a week and fortnight in laying hens has neither altered efficiency of feed conversion nor the egg production. There is a compensatory intake of feed on other days. Green lucerne treated with carbaryl 10% to control insects may be fed to poultry after 14 days of treatment without any deleterious effect.

4. 22. AGRICULTURAL EXTENSION

Percentage of dryland farmers adopting each of the recommended practices for cholam such as seed treatment, plant protection chemicals and balanced manuring was relatively low compared to gardenland farmers. Unpredictable monsoon, lack of adequate knowledge of farm practices, unpreparedness for taking risks, tendency to follow the non-adopting neighbours and friends, inefficiency of practices to meet the felt need of farmers and lack of initiative and interest were the main reasons for non-adoption of farm practices by dryland farmers. Farmers had gained more knowledge and skill through the peripatetic demonstrations on delinting of cotton with sulphuric acid and on spraying of planofix to check flower drop in cotton. Farmers using planofix were larger in number than those practicing delinting of cotton. The reason for poor response to delinting of cotton was non-availability of sulphuric acid in required quantity at village level. Panchayat Presidents were neither much interested nor actively participated in the implementation of Agricultural Production Programmes because of non-availability of inputs in time, implementation of programme by extension workers themselves, lack of knowledge on plan preparation and also non-consideration of their interest and participation in Agricultural Production Programme in election campaign.

Extension staff of sugar factory used more the individual contact approach for influencing cane growers than the staff of State Department, whereas the use of mass media was more by the staff of the State Department compared to those of sugar factory. State Department staff maintained contact with cane growers more frequently than sugar factory staff.

The impact of 'Ulavar Thunaivan' journal on farming community revealed that 80% of the farmer readers became aware of the recent improved practices such as seed treatment, plant disease control, top dressing and application of herbicides. Ninetyone per cent of the farmers opined that the journal is useful not only to know about research findings but also helped to adopt these findings.

4. 23. AGRICULTURAL ECONOMICS

The operational research project for rural development in Dharmapuri focussed on resource inventory and a malady-remedy analysis considering the

potentials available for output expansion and employment generation in farming. By scientific reorientation of the current crop pattern with existing resources, the opportunities exist for diversifying the economy and increasing output levels and employment for the farming population.

The study on the problems of dairy farming in Coimbatore taluk showed the relative cost differentials in production cost per litre of milk in the urban and rural areas. It was seen that the cost of production of one litre of cow's milk was 1.53 in the urban area, while it was 0.67 in sorghum leaves tract and 0.81 in sugarcane leaves tract. This is due to the maintenance cost of animals being less in the rural sector when compared with the urban sector. There is uneven supply of milk over seasons resulting in price distortions which neither benefits the producer nor the consumer. Institutional arrangements for evening out the supply and maintenance of high milk yielders will help to tide over this problem

A study on growth pattern of labour force indicated that out of 580 members in 100 households, 262 were earners. Out of this, 177 were in agricultural sector, 37 in industrial sector and 48 in service sector. All the earners in the non-agricultural sectors were employed in low and medium category jobs as fitters, machine operators, blowers, bus conductors and bill collectors. The study revealed that in the agricultural sector 98 members were fully employed for 101-200 days, 30 members for 201-250 days and only 20 members had full employment for over 251 days. On the other hand, in the non-agricultural sector, 26 members had full employment all through the year. During the busy season, the intensity of employment in farming depended on the nature of operations, kind of crop and system of hiring. On an average, during peak season, agricultural labourers worked for over eight hours but during slack season this got reduced to seven hours and less. Out of 37 agricultural labourers 25 of them preferred for switching over to non-farm jobs of an unskilled type. The study indicated that the farming should be made more attractive in terms of wages as well as a source for increased employment opportunities.

The study on cost of cultivation of sugarcane indicated that the per hectare cost amounted to Rs. 5605.22 and cost of production per quintal Rs. 7.13 in 1973-74. During the same period the cost of cultivation of paddy amounted to Rs. 1754.30 per hectare. The cost of production per quintal of paddy worked to Rs. 62.33.

The optimum farm plan for maximising farm income indicated the scope for increasing farm income by 33 per cent by an additional investment of Rs. 2,600 to Rs. 5,950 per farm. This approach affords for greater orientation towards farm planning and development.

The study on demand for vegetables in Coimbatore city based on an analysis of consumption in better placed households indicated that 5.5 per cent of the income was spent on vegetables and, on an average, the per capita consumption was 320 g. The Chinthamani Super Market supplied nearly 15 to 18 per cent of the daily demand of the vegetables. Based on this consumption, the estimated requirements of vegetables in Coimbatore is about 100 tonnes a day.

The study on Financing Farm Development in Kancheepuram taluk revealed that of all the investments, minor irrigation yielded the highest rate of return followed by land reclamation and farm mechanisation. The study focussed the need for organisation of irrigation cooperatives for fuller and efficient utilization of water. The project for conversion of dry lands into garden lands needs to be supplemented by projects for reclamation which included levelling, bunding and laying field channels so that water use efficiency could be improved.

The study on resource use pattern in Cauvery basin suggested that the resource reorganisation in the short run and resource development and management in the long run would stimulate larger increases in production, income and employment. A diversified crop system for optimal utilisation of the existing resources with built-in facilities for strengthening the infrastructure will go a long way in achieving the overall objectives.

The investigation on water resource management in garden land agriculture in Coimbatore taluk showed the strong need for evolving a water policy with a view to safeguard the interests of the rural economy. An analysis of 96 farms in 12 villages showed that under the present conditions of factor-prices ratios, it is not advisable to go beyond a depth of 132'. Growing of less water consuming crops and alterations in cropping scheme are recommended.

The employment earnings and levels of living of landless agricultural labour households in Annur block of Coimbatore taluk showed that the average size of labour household was 5.02. The percentage of earners ranged from 57.96 to 83.7. An overall analysis showed that nearly one fourth of the family members were without work. Sixty five per cent were severely unemployed, (less than 280 days) and 14.39 per cent were moderately employed (280 to 312 days). Only 25.49 per cent were fully employed (312 and more). The average days of employment was 195. The mean per capital annual income ranged from Rs. 459.74 to Rs. 520 and the expenditure was Rs. 582. The strategy for increasing the employment opportunities primarily depends on strengthening the irrigation facilities.

4. B. Research work by the post-graduate students :

The results of research work by the post-graduate students carried out during the year as part of the requrirement for the degree are summarised hereunder :

4. B. 1 Agricultural College, Coimbatore

Agricultural Botany : The genetic divergence analysis on 32 rice types indicated that among Indian types, TKM 6 formed a seperate cluster distinct from Co.13, Co 29, ASD 1 and Kannagi This indicated that the resistance pests and fine grain quality of TKM 6 can be profitably transferred to these types by recombination breeding. The maximum contribution towards genetic divergence was obsereved for grain weight and flowering duration Association and path analysis for yield and other economic traits indicated that high magnitude of direct effect on yield was due to grain number, grain weight and tiller number.

Investigations on induced mutagenesis with gamma and EMS were taken up with two inbreds of pearl millet namely J.104 and TIFT. 23-D2-B indicated that TIFT. 23 D2-B was found to be more sensitive to mutagenic treatments than J. 104 Radiosensitivity of both the inbreds was found to have been increased when presoaked seeds were used. Useful phenotypic variants such as dwarf mutants, early types, individuals having longer panicle, small grained plants and mutants with higher number of grains per unit area were obtained.

Mutagenesis with the chemical NG was induced in two ragi genotypes MS-2698 and SARADA. The variety SARADA was more sensitive to mutagenetic treatment than MS.2698 in respect of shoot length while this variety was more resistant when root length reduction was considered. As a results of treatment with NG, mutants with early maturity, dwarf stature high yield and bold grain which are economically important have been obtained.

Interspecific hybridisation was attempted in the genus *Arachis* to study the barriers if any, to successful hybridisation It was found that morphological differentiation of the species and the development of genetic barriers are incomplete. The cytological behaviour in hybrids points to the absence of any large structural differences or development of genic machanisms which inhibit pairing of chromosomes. It is evident that the natural tetraploid species have one genome in common with that of the diploids. In addition to genomic differentiation limited to genic and small structural changes, polyploidy and genetic mechanisms causing incompatibility and hybrid inviability also seem to have played a part in reproductive isolation of the species. They are developed to varying degrees in different species and, therefore, the changes for introgressive hybridisation also appear to be existent. Hybridisation of sele-

cted varieties of *A. hypogaea* with *A. monticola* and the allotetraploid hybrids (*A. hypogaea* x diploid spp.) may prove useful to meet immediate practical needs.

In cowpea, results of D² analysis on 50 varieties revealed the availability of wide sources of genotypes, with variable adaptation backgrounds. Varieties" Kolathur black", T. 495 and PLS.370 were suggested as desirable divergent sources for hybridization with the local types. The number of clusters per plant and pod number were observed to posses high association with yield per plant and hence these traits may serve as selection criteria towards the improvement of yield in cowpea.

An assessment of fifty blackgram varieties for their breeding value revealed that one of the types namely PLS.44 from Tamil Nadu possessed high variability for seed yield, pod numbers, pod length and number of branches. This type was recomended for intensive selection and screening for high productivity. Three other types M.5, PLS.364 and PS.8 proved to be fit for direct introduction as varieties suitable for cultivation in Tamil Nadu. Path analysis results revealed the dependency of pod number as an index for identifying productive genotypes.

Studies carried out on 85 greengram varieties to assess the extent of variability, inter relationship of yield and its components revealed that wide variable sources for high clustering, pod production and seed yield were available for selection and introduction. Correlation studies revealed that seed yield was closely associated with cluster per plant, pods per plant and pod weight. Path analysis also showed evidence that these traits have direct effect on yield per plant.

Two Cambodia cotton varieties, K 3400 and MCU 6 were subjected to induced mutagenesis with the object of isolating economic mutants. Germination and survival were drastically reduced by both the mutagens, X-rays and DES. Induction of lateness and reduction in number of bolls as well as kapas yield per plant were observed proportionate to dose level in the case of X-rays while no such effect was found in DES treatments. In ginning outturn, significant differences were observed in DES treatments, especially in variety K 3400. Mutant lines with superior fibre character coupled with higher yield and ginning outturn have been isolated.

In the investigation on pasture grass improvement *Cenchrus ciliaris* was evaluted for productivity and regeneration capacity of clones under continuous cuttings. Four clones namely C.319, 378, C. 874 and C.194 were identified as high yielding among which, C.378 had high phenotypic stability for yield. The clone C. 378 was recommended for multiplication and testing in multiplication trials. Correlation studies on these clones indicated that number of

tillers and length of leaf and breadth were highly associated with yield. Among these, number of tillers exerted the maximum direct effect on yield.

Agronomy : A study was conducted to assess the suitability of rice varieties for planting in late *kharif* season and to investigate the possibility of compensating the yield decline due to late planting, by various ameliorative measures. Among the varieties tested, IR. 20 performed better than IR. 8 and Bhavani. Hence, IR. 20 could be recommended for late planting in *kharif*. Yield decline due to late planting could not be made up by ameliorative measures such as increased dose of N and P, and application of Fe and Zn. However, combined application of ferrous sulphate at 50 kg/ha and zinc sulphate at 25 kg/ha through soil at the time of planting increased the yield by 19.6 per cent over control and could be recommended for late planted crop. In a weed control study with transplanted rice (IR. 20), it was found that application of stomp granules at 1.5 kg a.i./ha 4 days after planting gave effective weed control both in summer and *kharif* seasons. Application of N at 120 kg/ha in summer and 180 kg/ha in *kharif* along with this herbicide treatment gave the maximum net income of Rs. 3,945/ha in summer and Rs. 3617/ha in kharif. Manual weeding at the same N levels gave about Rs. 1000/ha less in come than in herbicide treatment in both the seasons.

An investigation was undertaken to study the possibility of increasing the row spacing in sorghum for accommodating intercrops without reducing the yield of the base crop sorghum, with three genotypes of varying architecture in *kharif* under rainfed conditions. Increasing the row spacing beyond 45 cm reduced the grain yield drastically in tall growing genotypes-Uch H. 1 and Co.21, but the dwarf genotype CSV.4 was able to adjust to wider row spacings upto 90 cm without any reduction in yield. Under the normal row spacing of 45 cm. the performance of all the three genotypes was similar. Hence, it is possible to increase the row spacing upto 90 cm with CSV. 4 for accommodating intercrops in the inter-row space and utilising the solar radiation effectively. In an intercropping study with sorghum (CSH. 5) in *kharif* under rainfed conditions, it was found that planting sorghum in paired rows of 30 cm and raising two rows of black gram (Co. 2) in the interspace of 60 cm gave the maximum net return of Rs. 6700/ha and an increased income of Rs. 850/ha over pure crop of sorghum. Raising inter-crops did not affect the yield of the base crop, sorghum. For cumbu (NHB. 3), scheduling irrigation at 25 per cent depletion of available moisture and controlling weeds by pre-sowing application of atrazine at 0.4 kg a.i./ha gave the maximum net return of Rs. 1900/ha and increased income of Rs. 460/ha over two hand weedings. Irrigation at 25 per cent depletion of available moisture involved about 8 irrigations in black soil in summer. Application of atrazine at 0.4 kg a.i./ha to cumbu had no phytotoxic effect on the succeeding crops--cotton, greengram, lab-lab, cowpea, blackgram, sunflower and ragi.

For CBS.156 cotton grown in winter, application of 80 kg N/ha in two splits viz. basal and 40th day of sowing and planting in paired rows of 60 cm with 90 cm interspace gave an increased income of about Rs. 2000/- over the normal method of planting with 75 cm spacing. The interspace of 90 cm can be profitably utilised for raising a short term intercrop like blackgram or onion. In a study conducted to find out possibility of sowing winter cotton in the stubbles of preceding cereal crops without any preparatory cultivation, it was found that the yield of seed cotton was not affected by sowing in the stubbles of maize and ragi. There was slight reduction in yield, when the crop was sown in sorghum stubbles. Hence there is a saving of Rs. 200/- (two hundred only) by avoiding the preparatory cultivation and sowing in the stubbles.

An investigation was undertaken to study the effect of different mulches on the micro-climate and yield of winter combodia cotton MCU 5. The results revealed that the soil temperature was lowered due to mulching. The yield of seed cotton increased significantly due to mulching, the increase over control being 44% with white rubber mulch, 42% with cumbu straw and 14% with black rubber mulch.

In an experiment conducted to study the effect of different moisture regimes and topping on summer cotton, (MCU. 7) it was found that scheduling irrigation at 80% depletion of available moisture, recorded the maximum yield of seed cotton. This treatment involved 6-9 irrigations in black soils. Topping on 90th day of sowing gave higher yield (14%) than no topping.

Raising groundnut (POL.2) and sunflower (EC.68413) in 1 : 1 ratio in *kharif* and 4 : 7 ratio in summer gave the maximum seed yields and net return. Mixed crop of groundnut and sunflower was more profitable (Rs. 1450/ha) than the pure crop of groundnut (Rs. 1250/ha) or sunflower (Rs. 1000/ha).

Sunflower (EC. 68413) gave the maximum seed yield with the application of 50 kg each of N and P per hectare under irrigated conditions and 30 kg each of N and P per hectare under rainfed conditions. The spacing of 45 x 22.5 cm gave maximum yield both under irrigated and rainfed conditions.

Sesamum (TMV. 3) recorded the maximum seed yield with a spacing of 40x30 cm and 20 kg N per ha under irrigated conditions in summer (655 kg/ha) and rainfed conditions in *kharif* (675 kg/ha). Raising sesamum (TMV.3) and greengram (Co.2) in 1:1 ratio with the addition of 15 kg N/ha gave the maximum net profit of Rs. 827/ha. Pre-emergence application of alachlor at 1.75 kg a.i./ha gave effective weed control in sesamum (TMV.3) and increased income over hand weeding was Rs. 500 per hectare. The herbicide applied to sesamum had no adverse effect on the germination and growth of the succeeding crops-maize, tenai, black gram, red gram and horsegram.

Soil Science and Agricultural Chemistry: Efficacy of schoenite as a potassic fertilzer was evaluated with Co.10 *ragi* as test crop in two soils viz., high level laterite and red soils on comparison with potassium chloride and potassium sulphate on equal K 0 basis. Application of schoenite significantly increased the uptake of various nutrient elements than other potassic fertilizers. The response to schoenite was higher in laterite soil than in red soil. The yield of *ragi* grain was increased by the application of schoenite and it was on par with other potassic fertilizers. The nature of distribution of different forms of K in Nilgiris soils was studied and the total K content was found to decrease with depth in most of the soils. The water soluble, exchangeable, non-exchangeable and total K were in equilibrium with each other. All the soils of Nilgiris had low K fixing capacity.

A field experiment was conducted to evaluate N-lignin as a slow release nitrogenous fertilizers with CO.10 *ragi* as test crop. N lignin was found to be on par with urea with regard to yield and uptake of N. Application of N-lignin increased the total and available N of the soils at all the stages of plant growth.

The influence on soil moisture regimes, doses of added N and their interaction on the availability of major nutrients and the yield of *ragi* was tested in red and black soils. The available N content of the soil was influenced by moisture levels, whereas the available P and K were not. Highest yield was obtained when the soil moisture was maintained between 60 and 100% available soil moisture and at 135 kg N/ha level. Uptake of N and P by plants was also influenced by higher soil moisture.

The results of an experiment conducted on the addition of sewage wastes have shown that the physical properties such as total, capillary and non-capillary pore space were influenced. Addition of sewage increases the organic carbon content and concentration of exchangeable cations K, Ca, Mg and Na. The uptake of P,K, Ca, Mg, Zn and Cu was increased by the addition of sewage in sorghum CSH. 5

Application of P and K at 60 kg P_2O_5 and 90 kg K_2O per/ha significantly increased the number of root nodules, yield of pods, oil and protein contents of groundnut POL. 2. The total uptake of N, P and K by the plants was incresed by the application of P and K in both calcareous and non-calcareous soils. The experiment on Fe nutrition of groundnut revealed that plants responded well to the application of Fe-EDTA. The application of Fe at 20 ppm as Fe_2SO_4 with FYM at 12 t/ha in non-calcareous soil and Fe at 20 ppm alone in calcareous soil increased the yield of pods.

An experiment conducted with CSH.5 sorghum with four levels of cotton leaf (0,5, 10, 20 t/ha) and four leve's of Fe_2SO_4 (0,15,30 and 45 ppm) has shown that the highest grain and straw yield were obtained by the combined application of cotton leaf at 20 t/ha and Fe_2SO_4 at 45 ppm. Available Fe_2 content of the soils and the uptake of Fe by plants were high in the combined application of cotton leaf and Fe_2SO_4 at the above levels.

Studies on the distribution of soil micronutrients Cu, Zn, Mn and Fe in soils of Namakkal taluk indicated that total Cu increased with depth and was closely related to clay and silt content of the soils. Total Zn was high in alluvial soil and found to be closely related to the organic matter content. Total Mn was high in black soils and was closely associated with clay content. Total Fe content was high in alluvial soils and was positively associated with organic matter, clay content and CEC of soils. Available Cu, Zn, Mn and Fe were high in alluvial soils.

Evaluation on forage crops viz., Hybrid Napier NB-21, Guinea grass, maize, cowpea and lucerne by *in vitro* fermentation technique and chemical estimation of cell wall components has shown that the dry matter digestibility was dependent on the age of the plants. The dry matter digestibility and crude protein content of different crops decreased with maturity.

Agricultural Entomology: Neem seed kernel powder and neem oil emulsion (25 per cent) were effective seed protectants for pulse seeds against the damage by the bruchid, *Callosobruchus chinensis* and were also valuable antifeedants against the tortoise beetle, *Chirida bipunctata* infesting sweet potato.

Investigation on the control of major pests of bhendi revealed that aldicarb granule at 1.5 kg a.i/ha at sowing registered good control of leafhopper, aphid and mite, besides increasing the yield substantially. At this dosage, there was no detectable residue even in the first harvested fruit. Monocrotophos (1.0 l/ha) sprayed five times at 10 days interval commencing from 20 days after sowing was very effective in controlling aphid, leafhopper, mite and fruit borer in bhendi besides increasing the yield significantly. However, a waiting period of 4 days is to be adopted to achieve the tolerant toxic residue level in the fruit.

Studies on the incidence of *Aphis craccivora* and its predators in *Dolichos lablab* in crops sown in different months brought to light that the population was maximum in crop sown in October while it was minimum in crop sown in May. Application of disulfotan was observed to affect the population of both aphid and predator. Treatment with monocrotophos also resulted in greater mortality of grubs and adults of the predator, *Menochilus sexmaculatus*, while endosulfan was safer to the predator.

Detailed investigations were made on the factors affecting the performance of aldicarb applied to cotton. The persistance of aldicarb in soil was longer during December-April in all soil types. The chemical persisted longer in black clay than in alluvial clay and red silty loam. Distribution of rainfall had more impact on the loss of the toxicant from the soils than amount of rainfall and soil temperature. Side dressing on 45th day was found to be more effective than basal application or side dressing on 90th day against *Aphis gossypii*. Delaying the application of aldicarb beyond 45th day was not found to be helpful in suppressing the field population of leafhoppers.

Addition of organic matter reduced the effectiveness of aldicarb in black clay soil at higher dose. In red sandy clay loam, reduction in the effectiveness of the toxicant was observed with increase in the amount of organic matter incorporated. Aldicarb and its metabolites enhanced the population of bacteria and actinomycetes while they inhibited the population of fungi.

Studies were carried out on the biology, seasonal incidence, varietal susceptibility and chemical control of the shootfly, *Atherigona destructor* infesting Panivaragu *Panicum miliaceum*. The fly completed its life cycle in 16 to 21 days. The incidence of the fly was maximum from June to October while it was minimum during other months. Shootfly incidence correlated positively with minimum temperature, relative humidity and number of rainy days. None of the 100 varieties screened showed good resistance to the fly. Soil application of carbofuran, aldrin and phorate were observed to be highly effective in the control of the shootfly.

Plant Pathology : In sunflower *Alternaria* leaf spot disease incidence ranged from 0 to 62% in Tamil Nadu. It was severe during the months of November to February and a positive correlation existed between the disease index and days of low temperature (below 20°C). The pathogen was seed-borne, soil borne and air borne. The symptoms could be differentiated into necrotic, halo and pre-halo zones. Respiration, and polyphenol oxidase, peroxidase, and catalase activities increased in the halo and pre-halo regions. In the necrotic zone, these activities decreased in advanced stages of infection. Photosynthetic activity was impaired due to infection. Sugar and starch contents decreased while phenols accumulated in the infected leaves. Changes were also observed in protein, amino acids and mineral content due to infection. The pathogen produced toxic and pectic and cellulolytic enzymes in culture. Fytolan, dithane M. 45 and ziram were effective in controlling the disease.

Rust disease of sunflower was found to occur only between June and February. Temperature above 31°C was found unconducive for the disease development. Plants grown at 20°C showed high incidence of the disease and uredospores of the pathogen germinated well at 20°C and poorly at 30°C. The top (young) leaves from plants upto the age of 45 days were free from the disease. The resistant young leaves showed high respiratory activity. Sugar content does not seem to have any relation with the rust disease incidence. Sugar content reduced while starch content increased due to infection. There was not much difference between the susceptible and resistant leaves in the phenolic content and in the inoculated tissues, phenolic content decreased. Resistant leaves contained more of amino nitrogen, protein nitrogen and total nitrogen than the susceptible leaves. Due to infection, general increase in protein and total nitrogen content in both susceptible and resistant leaves was noticed. Application of different levels of nitrogen had no appreciable effect upon the disease incidence. All the 126 cultures of sunflower tested

were found to be susceptible to the disease. Dithane M 45 and vitavax controlled the disease and increased the yield significantly.

Gingelly phyllody disease incidence ranged from 7.3 to 53.2% in Tamil Nadu. The pathogen was transmitted by the jassid, *Orosius albicinctus* and by grafting. The pathogen also infected sunnhemp and *Petunis hybrida*. Tetracycline and oxytetracycline ameliorated disease symptoms resulting in the elongation of internodes, increased in size of leaves and production of normal flowers which set capsules. These antibiotics were effective when applied through the stem by wick-feeding and as foliar sprays but not effective when applied to soil by drenching. Gibberellic acid spray increased the height of diseased plants but normal flowers were not produced. Application of contact and systemic insecticides in the field did not reduce the disease incidence significantly though they reduced the vector population. Application of N, P, K, Zn, Mg, Mn and Fe did not reduce the disease incidence. Five gingelly types, Si. 259, Si. 2557, Si. 2640, Si. 2780 and Si. 3289 showed field tolerance to the disease. The pathogen failed to grow in axenic culture. Physiology of the infected plants was also studied.

Charcoal rot of gingelly was found to be not only externally seed borne but also internally seed borne. The hypocotyl region was found to be the initial site of function. Two isolates of *M. phaseolina* produced pycnidia *in vitro* and on sesamum plants under conditions of artificial inoculation and among the various factors tested continuous light favoured maximum pycnidal formation. The pathogen was found to posses macerating activity, endo-PG and PGTE both *in vitro* and *in vivo* among which the production of endo-PG was predominent. The fungus also produced cellulase (Cx and Cl *in vitro* and *in vivo*). In an experiment to assess the effect of pH and temperature individually and in combination, a pH of 5.6 at 32 ± 1°C was found most favourable for macerating activity and endo-PG. Evidence for the production of a thermostable toxin in culture and in the host plants was obtained. This toxin was found to inhibit respiration and caused cell permeability changes and it was translocable in the stem causing discolouration, wilting and death of plants. From work on control measures, seed treatment with benlate or captan or bavistin each at 0.3% concentration was found very effective and as a soil drench, benlate 0.1% or brassicol 0.1% was found to be most efficacious in reducing infection.

Macrophomina phaseolina (Tassi) Goid., was found to cause a tip blight disease on blackgram crop besides root rot disease. The tip blight isolate could cause root rot although less severely, while the root rot isolate could not induce the tip blight. There were no appreciable morphological different between the two isolates when they were grown in different medium containing various carbon and nitrogen sources and at differ-

ent pH. Both the isolates grew well in media containing starch, maltose, ammonium nitrate, peptone and asparagine and at pH 7 and temperature ranging from 30-35°C. The root rot isolate grew well in hypocotyl extract medium, while tip blight isolate grew well in leaf extract medium. Young cultures of both the isolates were more virulent and older plants were highly susceptible. All the 20 blackgram varieties tested were susceptible to both the isolates. Both root rot and tip blight isolates have been found to produce root rot and tip blight disease symptoms on greengram, cowpea, bean, gingelly, sunflower and cotton plants. Both the isolates produced some toxic substances *in vitro* and pectolytic and cellulolytic enzymes both *in vitro* and *in vivo*. In general, there was increase in respiratory rate and total nitrogen, phosphorous, calcium and potassium contents of blackgram plants infected with tip blight isolate. But in root rot infected plants except total soluble sugar phenolics and nitrogen contents, potassium and calcium contents decreased. Addition of glucose in pectin medium reduced the polygalacturonate transeliminase production by the tipblight isolate, while it increased the enzyme production by the root rot isolate. Calcium nitrate at higher concentrations was found to reduce the PGTE production in both cases. Generally the phenolics were found to inhibit the PGTE activity of both the isolates. Benlate and bavistin were found to be most effective in controlling both the diseases.

A systematic study of the head mould disease of sorghum in three consecutive seasons revealed that in the *kharif* season the incidence was uniformly severe. A highly significant positive correlation existed between the disease intensity and rainfall. High intensity of infection was noticed on CSH. 3, Co. 18, SB. 803 and SB. 411 while 19-3 showed the least. *Fusarium moniliforme, Curvularia lunata, Helminthosporium tetramera, Aspergillus niger, Aspergillus oryzae, Alternaria sp.* and *Phoma sp.* were isolated from mould head. Most of these fungi invaded the endosperm and embryo. The germinability and seedling vigour were reduced by mould fungi. Reduction in carbohydrates, protein, fat, calcium, thiamine and riboflavin content and calorific value was observed in sorghum grains as a consequence of mould infection.

Horticulture : To reduce the height of plants in the Monthan variety of banana studies with Alar, CCC and Ethrel revealed that Ethrel at 250 and 500 ppm remarkably reduced the height of plants. Besides causing reduction in plant height, Ethrel at 500 ppm produced the highest number of suckers, numbering 23 per clump, accounting for an increase of 77% when compared to the control, thereby indicating that Ethrel is one of the means to increase the sucker production in shy suckering banana varieties.

The effect of different levels of potassium on the growth and development of banana cv. Robusta through soil at 100 to 300 g and through foliage

(at 25 g/plant) and in combination increased the T. S. S., reducing sugars, non-reducing sugars and total sugars with reduction in acidity. Addition of K_2O did not increase the yield in soils rich in available K_2O.

In the micronutrient studies on Co. 2 tomato, soil application of zinc at 5 ppm increased the yields to as high as 50 t/ha accounting for an increase of 28% over control (38 t/ha). Further, zinc treatments (5 and 10 ppm through the soil) increased the fruit grades as well as marketable fruits. The marketable yield was 48 t/ha as compared to 36 t/h in the control and the increase was 32%. In addition to the increased yields, zinc treatments improved the quality of fruits considerably by increasing the ascorbic acid content to an extent of 52% over the control and the correlation studies have also established the positive correlation of Zn with ascorbic acid to a highly significant level.

Cu at 20 ppm through soil had a marked effect in enhancing the quality of fruits, the increase being 45% in ascorbic acid, 27% in total sugars and 54% in reducing sugars when compared to control. Copper also imparted attractive colour to the fruits and increased the seed yield by 27%.

The effect of Ethrel on three sweet potato clones viz., IB.2, IB.5 and IB. 81 was studied in relation to tuber maturity, tuber yield and quality. The potentials of tuberisation was achieved within 60 days after planting and continued till the 120th day after planting in the three clones tested. Ethrel application at 250 ppm increased the tuber yield by 66% in IB. 81, 55% in IB. 3 and 42% in IB. 2. This significant increase in yields is due to a high harvest index which showed a positive correlation with the tuber yield. Ethrel sprays improved the quality of tubers by increasing the carotenoids content by 30 per cent and ascorbic acid content by 19% over the control. Weevil infestation was reduced significantly by Ethrel treatment and this reduction is due to perceptible increases in carotenoids, ascorbic acid and sugars caused due to Ethrel sprays.

In a study to recommend an optimum manurial schedule for Pari Mullai (*Jasminum auriculatum*), the treatment N (120 g), P_2O_5 (240 g), K_2O (240 g) and FYM (30 kg) per plant applied in six split doses significantly increased the yield, the increase being 234% over the control. Besides increasing the total yields, this treatment promoted the yield of flowers during the lean months of September, October and November. The additional benefit of this treatment is its marked increase in concrete yield, registering 17.45 g of concrete per plant as against 9.31 g plant in the control.

The flower bud initiation in *Jasminum auriculatum* cv., Pari Mullai was early in late pruned plants done in March, when compared to the January pruning which is the normal pruning period for this cultivar. In the early pruned plants during November the flower bud initiation was delayed. Early

pruned plants extended the duration of flowering from March to October, while the late pruned plants had a short flowering duration. However, the peak season of flowering from May to August was not influenced by all the treatments. Plants pruned on 28th January recorded the highest yield of flowers.

The flowers from the plants pruned in 8th November and January yielded the highest recovery of jasmine concrete while it was lowest in the case of November 18th pruned plants. Flowers picked between 6 a. m. and 7 a. m. yielded the highest recovery of concrete.

Agricultural Economics : An integrated approach was followed to identify the agro-economic problems of the PAP region and in resolving them through an appropriate policy instruments. Each student was assigned with one problem in this region.

A study on marketing of groundnut in this region covering 60 farms revealed that the marketable surplus was about 80% of total production. The disposal was mainly through village merchants and mill representatives. The retention for seed formed only 12%. Major portion of production was disposed immediately after harvest. Village merchants handled roughly 60 per cent of the marketed surplus. The farmers received 87% of the price paid by the consumer whether they sell it through village merchant or mill representative. The market structure was identified as near perfect in assembling stage, oligopolistic imperfection in processing market, and near perfectly competitive in distributing market. Total production and price were found to influence the marketed surplus significantly.

A study was undertaken to estimate the credit requirement, level of supply, size of credit gap, share of credit by different agencies, cost of credit and investment pattern in the PAP region. The credit requirement varied from Rs. 3,60,600 to Rs. 2,22,000/- for the large and medium farms. The credit gap was 26.8 and 40.3 per cent respectively duing project and non-project year. Money-lenders contributed 35 per cent of the requirement whereas co-operatives have contributed nearly 27 per cent of the credit required. The cost of credit varied from Rs. 133 per Rs. 1000 - loan in commercial bank to Rs. 222 per 1000/- loan in money lenders. Investment in irrigation structure was given priority by the farmers of this region.

The study on resource use efficiency in milk production in PAP region was made with a sample of ninety respondents. The average dairy herd size was 1.9 per farm. The desi cows gave an yield of 1070 litres per year leading to a net income of Rs 118/-. Net cost of production worked out to Rs. 1.09 per litre. The cross-bred cow gave an yield of 1778 litre per year. The net cost of production worked out to Rs. 1.00 per litre. Nearly 50 per cent of the total cost is accounted by roughages. Desi buffalo and cross-bred buffaloes yielded

cations and Journals. The flow of information from the Extension system to the client system (farmers) was mainly through farm visits. Extension personnel had given equal attention to all types of farmers, i.e., progressive farmers with small holdings and farmers with large holdings. The researchers evaluated the new findings by testing them in farmers' fields and the extension personnel evaluated the farm information by way of consultation with fellow workers. The first source of information for farmers was found to be formal source Deputy Agricultural Officer and Gramasevaks. The farmers evaluated the new information on High Yielding Varieties of paddy by considering its profitability. Farmers consulted friends and neighbours and village level workers before final decision on adoption of farm practices were taken.

Study on the relative effectiveness of combinations of extension methods revealed that either combinations of lecture aided with slides followed by discussion or lecture aided with flash cards followed by discussion was found distinctly more effective in gaining knowledge than lecture followed by discussion in the overall appraisal irrespective of age and education of farmers. Study of stage concept in innovation decision process indicated that the majority of farmers were found to pass through the six stages in the innovation-decision processes namely awareness, evaluation I, interest, evaluation II, adoption and evaluation IV satisfaction-dissatisfaction. Continued rejection wasin greater proportion than discontinuance or continued adoption or late adoption. Readoption was found to be negligible. The trial stage which is generally believed to be a pre-condition for large scale adoption was not witnessed in this study.

Study of route of innovation-information revealed that among the sources in the research system, the crop raised in the research station was the main utilized source for getting first information followed by crop specialist and other researchers. Among the extension personnel, Gramasevaks followed by Deputy Agricultural Officers were the most utilized sources for first information. Among the neighbourhood agencies, neighbours were the most utilized source. Regarding the preferential choices of sources and media, farmers preferred crop specialised in the research system, Gramasevaks in the extension system, neighbours in the neighbourhood agencies and radio among mass media. Commercial agencies did not play significant role as sources for first information. Study of the communication behaviour of gardenland and dryland farmers showed that farm broadcast, block officials, Gramasevaks, friends and neighbours and campaign were the most utilised sources by the gardenland farmers. Friends, neighbours and Gramasevaks emerged as the most utilised source by dryland farmers. Gardenland farmers had used mass media more than dryland farmers. The average information input of gardenland farmers was significantly higher than that of dryland far-

mers. Compared to dryland farmers, the average use adoption and symbolic adoption quotient and the average information output were all significantly high among gardenland farmers.

Seed Technology: Seeds of two blackgram varieties viz., M 3 and Co 3 collected from a single harvest were artificially aged at the ageing regimes (45 C + 0.5 C and 95 ± 2% RH) for different durations. The treated seed lots were evaluated for vigour with various criteria and correlations were worked out between each one of them and germination and field emergence to determine the association. Accelerated ageing beyond three days was found adequate for hastening seed deterioration, resulting in loss of vigour and viability. Periods of accelerated ageing, storage period and the inherited vigour of the cultivar exerted a profound influence in altering the initial vigour and viability. Considering the significant associations between the various parameters, the seed vigour tests namely, vigour index, 4 per cent ammonium chloride soak test, electrical conductivity of the seed leachate and the estimation of the free amino acids are recommended. These four tests are to be performed conjointly with the germination test for evaluating seed quality.

Investigations were carried out with sunflower E. C.68413 from January, 1975 (M 1) to December 1975 (M 12) to study the effect of time of sowing and the influence of temperature and relative humidity that prevailed inside the crop canopy on crop growth, yield and quality of seeds. Significant differences were observed due to time of sowing in height; diameter of stem and head; number of leaves; number of total and mature seeds per head; days taken for field emergence, head-visible stage, flowering and seed maturity; seed yield and recovery percentage of size grades of seeds. Height of plant, diameter of stem and head, and number of total and mature seeds-per head showed significant and positive association with seed yield. The recovery per centage of size grades of seeds was maximum in S3 (42.17), followed by S4 (33.99), S5 (smallest-18.24), S2 (17.28) and S1 (boldest-5.27). Among size grades of seeds, significant differences were observed in 1000 seed weight, kernel/hull ratio, germination, field emergence, vigour index, dry matter production, membrane permeability, sugar exudation, germination after accelerated ageing and protein content. Seed weight was found to increase with increase in seed size. Kernel content was found to be positively associated with germination percentage of seeds. All size grades of seeds obtained from M9 recorded the highest germination while those from M2, the lowest. A linear relationship existed between dry matter production on one hand and size and weight of seeds on the other. Germinability, vigour and storability in the large and medium size seeds were found to be better than small size seeds. Warm temperature and moderately wet humid conditions appear to be ideal for the development of quality seeds.

Graded seeds of Co.1 cowpea were compared with ungraded bulk for

seed quality attributes, crop growth and yield. The weight of thousand seed, primary axis, cotyledon and seed coat; the electrical conductivity value, quantity of free amino acids and sugars in the seed leachate and protein content in the seed were found to increase with increase in seed size. Large size seeds possess better germination, more vigour and better storability than small seeds. Length of shoot and hypocotyl of seedlings, vigour index and dry matter production were positively correlated with seed weight. Two grades of seeds after treatment with six seed protectants viz. malathion, nuvan, celphos, captan, neem kernel powder and activated clay were packed in three containers viz., gada cloth bag, aluminium foil, polyethylene laminated pouch and double packets of 300 gauge polyethene bags and kept in storage under ambient temperature and relative humidity. Significant differences in seed moisture content and thousand seed weight due to grades, containers, seed treatments and periods of storage were observed. The moisture content of seeds was the maximum, while the thousand seed weight was the minimum at the end of ten months' storage. The differences in the germination of seeds due to seed treatments and period of storage were highly significant and the germination declined with the increase in storage period. Seed vigour tests had clearly brought out the importance of grading seed lots and storing cowpea seeds in paper packets. Protein content in the seeds was found to decrease with increase in storage period. A positive association between the incidence of seed borne pathogen and reduction in protein content was evident. Seed treatment either with malathion or nuvan or calphos had effectively protected the seeds from storage pests up to ten months. Treatment with activated clay appeared to be equally effective in preventing pest infestation up to a period of five months in cloth bag and seven months in aluminium foil laminated pouches and polythene packets. Severe incidence of *Callosobruchus chinenisis* L. was recorded in the untreated seed lots after nine months of storage.

Studies were carried out with Bhendi variety Pusa Sawani to determine the effect of picking of fruits for vegetable on seed yield and seed quality. There were seven treatments viz., no picking, harvesting two, four, six, eight, ten and twelve first formed fruits as vegetable and leaving the remaining fruits for seed purposes. Highly significant differences were observed among the treatments and among different pickings within each treatment for number of fruits, final height of plant, number of seeds per plant, yield of fruits and seeds shelling outturn, hundred seed weight, germination and vigour of the seeds. The height of plant increased with increase in the number of fruits picked as vegetable. The development and maturation of fruits and seed were found to be significantly influenced by the position of the fruit on the plant.

The influence of seed size and its inter-relationship with physico-chemical, physiological and production traits in CSH. 5 hybrid sorghum, its parents (CS 3541 and ms 2077A) and the maintainer line 2077B were evaluated. The percentage recovery of seeds in 10, 9, 8, 7 and 5 round perforated metal sieves

was found to vary with the cultivars and it was high in 9 and 8 and low in 10 and 5 sieves. In general, seed volume, specific gravity and thousand seed weight exhibited a linear relationship with increase in seed size. In respect of germination percentage and rate of germination the first three grades were on par and superior to the last two grades. The hybrid and the 'R' line were superior to the A and B lines. The results obtained from the brick grit test confirmed the superiority of the 10 and 9 retained seeds. The germination potential of seeds soaked in ammonium chloride solution varied with size. The root and shoot lengths of seedlings of the 'R' line had higher values than from others. Highly significant positive relationship was observed between seed size and root and shoot length of seedlings. The results of germination and vigour tests conducted with the five grades of seed in these lines revealed the superiority of the top two size grades over others. The 'R' line and the hybrid showed significant superiority over the isogenic lines. The restorer line exhibited high vigour index value when compared with the hybrid and the other parent. The hybrid seeds produced taller plants than others. Culm diameter and number of leaves per plant varied with the growth period and was not influenced by seed size. The hybrid plants had the maximum leaf area. The panicle emergence was delayed by four days in 5 retained seeds. The hybrid reached 50 per cent flowering earlier than its parents. The seed yields and harvest index values were significantly more from the first four seed sizes than from 5 retained seeds. The seed development and maturity studies indicated that the dry weight of seeds increased rapidly up to 30 days and beyond this period, the increase was gradual. The maximum dry matter accumulation was between 30 and 40 days. Seed samples dried to 9.5 per cent moisture content were separately treated with (i) Ultra-violet rays, (ii) Phoxim and neem oil and (iii) Thiram and D. D. T. After treating, the seed samples were packed in (i) cloth bags and (ii) paper-aluminium foil-polyethylene laminated pouches and stored under ambient conditions. Seed quality determinations revealed (i) a negative association between moisture content and germination of the seeds; (ii) the dry weight got reduced during storage and it was more in polyethylene pouches than in cloth bags, and (iii) significant reduction in germination was observed after four months of storage in cloth bags and eight months after in aluminium foil laminated pouches. Seeds treated with Thiram and DDT registered comparatively high germination in both the containers. Infestation by the storage pests was observed in seeds stored in cloth bags. The seeds coated with neem oil were free from insect infestation. The untreated seeds stored in cloth bags were infected by external seed borne microflora more intensively than in the other container.

4. B. 2. Agricultural College, Madurai

The results of research work carried out by the post-graduate students as a part of the requirement for M. Sc. (Ag.) degree are briefly summarised below :

Agricultural Botany : In rice, the F4 diploid (2n = 24) progenies of the allotriploid hybrid, *Oryza sativa* (GEB 24, 2n = 4x = 48) x O. *perennis* sub sp. barthii (2n = 24) were screened for their reaction to moisture stress. Besides the parents, Co. 31, an improved drought resistant rice variety was also used as control. Radicle and plumule growth in D. mannitol solution at 11 atmosphere of osmotic tension, chlorophyll stability, relative water content of leaves, the level of proline content, root development on 30th day and the arrangement, size and frequency of stomata were the criteria considered for drought resistance. The progenies showing drought tolerance had higher values of the above criteria as compared to Co. 31. Among the criteria employed, plumule growth on 10th day and stomatal frequency had not given any indication as to their relevance in varietal drought resistance.

In a study on the induced mutagenesis in redgram *Cajanus cajan*, the long and short duration varieties were chosen and treated with gamma rays and EMS. The M1 effects such as lethality, injury and sterility were more pronounced after gamma irradiation. The varieties showed differential response to mutagens. Gamma rays were effective in inducing chlorophyll as well as viable mutants whereas the efficiency of mutagens varied with varieties. The mutants showed variability for protein content both in positive and negative direction of their parents as well as in yield components offering scope for selection. Mutants showing stature of plants, duration, number of pods, seed size and colour, and fertility would offer promise for further exploitation.

Agronomy : In the investigation to find out the efficiency of slow release materials, a study was made on IBDU, coated fertilizers such as Sulphur coated Urea, Lac coated Urea and urea treated with nitrification inhibitors such as N-serve, AM and neem oil. The results revealed that the crop receiving application of nitrogen at 100 kg per hectare in the forms of Sulphur coated urea, IBDU and N-serve treated urea recorded higher yields of rice Bhavani than that receiving N in the forms of urea treated with neem oil, lac coated urea and untreated urea.

The effect of rate and time of application of nitrogen on the grain yield and plant characters of high yielding rice varieties Co. 36 and Bhavani was studied. Variety Co. 36 recorded 6.2 per cent increased yield over Bhavani. Crop receiving N at 120 kg/ha registered the maximum grain yield of 6154 kg per hectare and was on par with that receiving 150 kg N per hectare (6115 kg, crop receiving 90 kg N recorded significantly lower yield (5801 kg/ha). Grain yield increased with increasing level of nitrogen application in variety Co. 36. Application of nitrogen in four splits (basal, tillering, panicle initiation and boot leaf stage) and in eight splits (basal, 10th, 20th, 30th, 40th, 50th, 60th and 70th day after planting) increased the yield of paddy.

The effect of irrigation regimes and nitrogen levels on grain yield and plant characters of ragi Co. 10 was studied. Grain yield was favourably

influenced by the levels of nitrogen application. Each increasing level of nitrogen application significantly increased the grain yield of ragi up to 80 kg N ha beyond which the increase was not significant. The levels of nitrogen for the maximum physical production and for economic level of production were found to be 101 kg and 90 kg/ha respectively. Grain yield was not influenced by the levels of irrigation regimes tried.

The response of Deccan Hybrid Maize to different row spacing, graded dose of nitrogen and its methods of application was studied. Maximum grain yield of 2831 kg/ha was obtained with closer spacing (45 x 25 cm) than from wider spacings of 60 x 25 and 75 x 25 cm. The yield increased with increasing levels of nitrogen. Application of 120 kg nitrogen per hectare applied through soil recorded the maximum grain yield of 3519 kg/ha.

Soil Science and Agricultural Chemistry : Studies were conducted on two red soils and two black soils from Madurai District to evaluate the effect of potassium fertilization and soil type on fixation and release of potassium. The experiment was carried out with IR 20 rice as the test crop and with four levels of potassium, viz. 0, 25, 62.5 and 100 kg of K_2O per hectare. The existence of an equilibrium among water soluble, exchangeable and non-exchangeable potassium was clearly evident from the studies and decrease in one from appeared to be compensated by an increase in the other. A regular progressive change of the various forms in the soil with the time was observed. Close dependence of the three forms of potassium from one period to the other and from one form to the other would indicate the maintenance of a predictable regularity throughout the period of crop growth. The uptake of potassium by grain, straw and total dry matter increased with the increase in the potassium level. It was seen from the soil incubation studies carried out simultaneously that an increase in the level of potassium increased the content of water-soluble, exchangeable and non-exchangeable potassium. Increase in the content of non-exchangeable potassium with the increasing levels of potassium application clearly showed that the fixation of the nutrient would be more if higher doses of potassium were applied.

A comparative study of the physico-chemical characters and categorisation of black soils of Southern districts of Tamil Nadu was made. Twenty five representative black soil samples were collected from the districts of Madurai, Ramanathapuram, Tirunelveli and Kanyakumari and subjected to detailed analysis for physico-chemical charecteristics. Based on the relationship observed with clay content and physical and chemical properties, a tentative classification into four texturally differentiated categories viz. sandy clay regur, medium clay regur, medium heavy clay regur and heavy clay regur was suggested. General agronomic significance for above groups was also given. The black soils of the Southern districts of Tamil Nadu were found to resemble closely the tirs of Morocco, black earths of Australia and black soils of Andhra Pradesh.

of *Rhizobium*, whereas dasanit stimulated the organism at 2 and 5 ppm levels. Indole acetic acid production potentiality of the organism was considerably affected at 10 ppm level of the insecticides like aldicarb, dasanit and disyston. Nodulation was significantly affected by dasanit and disyston at 10 ppm concentration.

Effect of insecticides on the metabolic activities of *Azotobacter chroococcum* indicated that aldicarb, disyston, dasanit, carbofuran and Ekalux at 2 ppm level enhanced the growth of the organism, whereas at 5 and 10 ppm levels, the growth was inhibited. The pigment production was affected even at 2 ppm level of the various insecticides. Nitrogen fixation of *Azotobacter* was inhibited at higher concentrations of the insecticides. Indole acetic acid production by the organism was enhanced at 2 ppm level of the insecticides.

The study on the industrial effluents from paper and pulp factories, chemical factories and plastic industries exhibited varied types of effects on the plant systems. The effluents from paper factories contained mercaptans and hydrogen sulphide and inhibited the growth of plants like paddy, maize, cotton blackgram and tomato. The inhibitory effect of paper factory effluents varied with the raw material employed for the paper manufacture, where bamboos were the raw materials, the inhibitory effect was serious. The effluents from chemical factories contained chlorine and mercury and caused harmful effect on the growth of plants like paddy, maize, cotton, groundnut and tomato. In the case of plastic factories, the effluent drastically inhibited the germination of most of the plant species, and only maize was found to germinate, but only to the extent of 23 per cent.

4. B. 4. Veterinary College, Madras

The results of the research work carried out by the post-graduate students as part of the requirement for M.V.Sc. degree are briefly summarised below:

Animal Nutrition: Investigations were conducted to determine the nutritive value of Agathi (*Sesbania grandiflora*) as green fodder. When fed as a sole feed for rams, the nutritive value of Agathi in terms of digestible protein and total digestible nutrients were 2.63 and 9.61 respectively for 100 kg of fresh materials.

A preliminary study was made to determine the metabolisable energy value of the thippi and to investigate the influence of different dietary metabolisable energy levels on the performance of chicks from 0-8 weeks of age. The metabolisable energy value of thippi as determined in this study was 1,204 k. cal/kg. The growth study and feed efficiency data indicate that both metabolisable energy level and crude fibre percentage of the diet influence the total consumption of feed an efficiency of feed conversion.

Agricultural Entomology : The population dynamics of stem borer, gall fly and leaf roller were maximum in the earlier stages of crop growth, 45-60 days after planting and at the boot leaf stage respectively. The reduction in yield due to rice stem borer was maximum at the first ten per cent infestation level and thereafter for every five per cent increase in infestation, the reduction in yield showed a decreasing trend. The economic threshhold level for rice stem borer was 8.2% in Bhavani variety, for gall fly 9.0% and 13.60% respectively in IR.8 and Co. 36 varieties and for leaf roller 6.30% in Co. 36.

Under laboratory conditions potato dextrose medium was found to be the best for the mass multiplication of *Bacillus thuringiensis*. The larvae of *Amsacta albistriga*, *Achoea janata*, *Phycodes radiata*, *Pericallia ricini*, *Cnaphalocrocis medinalis*, *Nephantis serinopa* and *Acherontia stix* were found to be susceptible to this preparation of bacilli in the laboratory. The pathogenecity of *Bacillus thuringiensis* was maximum at pH 6.0 and the wetting agents vetloplant and teepol when mixed with *Bacillus thuringiensis* enhanced the mortality of caterpillars. The mortality of the caterpillars was high when the bacterial preparation was exposed to 20 C for 24 hours. Dry formulation of pathogen was better for the control of *Tribolium* beetles on wheat flour.

4. B. 3. **Faculty of Basic Sciences and Humanities, Coimbatore**

Plant Physiology : In an attempt to identify physiological characters of an ideotype in groundnut, studies were initiated in TMV2, Ah 39 and Gujarat narrow-leaved mutant. Judged from the criteria of varietal characters, Ah 39 appeared to possess desirable traits for better metabolic events and higher productive ability than TMV 2 and GNLM. Topping on 75th day was most beneficial to CBS 156 Cotton, resulting in additional yield of 295 Kg/ha. For MCU 7 and PRS 72 topping on 90th day resulted in increases of 143 and 383 kg/ha respectively. Six varieties of rice were subjected to nitrogen application, with the object of increasing grain protein. Though genetic characters conditioned the protein value, it was possible to increase the quantum of protein incorporated in the grain by adjusting the nitrogen supply.

Calcium-sodium interaction in groundnut showed a complex matrix in the tissue content as well as carbohydrate and nitrogen status in both the leaf and shell. The regulatory mechanisms in the absorption by the root and the peg were different and were implicated in the optimal ratio of calcium-sodium, which was around 40-20. Deflowering in groundnut at three different phases, and their combinations altered the physiology of growth and development manifest in internodal extension and fertility co-efficient. Deflowering in the first phase was conducive for greater vigour.

Environmental Biology : Effect of insecticides on the metabolic activities of *Rhizobium* indicated that aldicarb, even at 2 ppm level, inhibited the growth

of *Rhizobium*, whereas dasanit stimulated the organism at 2 and 5 ppm levels. Indole acetic acid production potentiality of the organism was considerably affected at 10 ppm level of the insecticides like aldicarb, dasanit and disyston. Nodulation was significantly affected by dasanit and disyston at 10 ppm concentration.

Effect of insecticides on the metabolic activities of *Azotobacter chroococcum* indicated that aldicarb disyston, dasanit, carbofuran and Ekalux at 2 ppm level enhanced the growth of the organism, whereas at 5 and 10 ppm levels, the growth was inhibited. The pigment production was affected even at 2 ppm level of the various insecticides. Nitrogen fixation of *Azotobacter* was inhibited at higher concentrations of the insecticides. Indole acetic acid production by the organism was enhanced at 2 ppm level of the insecticides.

The study on the industrial effluents from paper and pulp factories, chemical factories and plastic industries exhibited varied types of effects on the plant systems. The effluents from paper factories contained mercaptans and hydrogen sulphide and inhibited the growth of plants like paddy, maize, cotton blackgram and tomato. The inhibitory effect of paper factory effluents varied with the raw material employed for the paper manufacture; where bamboos were the raw materials, the inhibitory effect was serious. The effluents from chemical factories contained chlorine and mercury and caused harmful effect on the growth of plants like paddy, maize, cotton, groundnut and tomato. In the case of plastic factories, the effluent drastically inhibited the germination of most of the plant species, and only maize was found to germinate, but only to the extent of 23 per cent.

4. B. 4. Veterinary College, Madras

The results of the research work carried out by the post-graduate students as part of the requirement for M.V.Sc. degree are briefly summarised below:

Animal Nutrition: Investigations were conducted to determine the nutritive value of Agathi (*Sesbania grandiflora*) as green fodder. When fed as a sole feed for rams, the nutritive value of Agathi in terms of digestible protein and total digestible nutrients were 2.63 and 9.61 respectively for 100 kg of fresh materials.

A preliminary study was made to determine the metabolisable energy value of the thippi and to investigate the influence of different dietary metabolisable energy levels on the performance of chicks from 0-8 weeks of age. The metabolisable energy value of thippi as determined in this study was 1,204 k. cal/kg. The growth study and feed efficiency data indicate that both metabolisable energy level and crude fibre percentage of the diet influence the total consumption of feed an efficiency of feed conversion.

In vitro dry matter and organic matter digestibility and production of volatile fatty acids *in vitro* of paddy straw, paragrass, lucerne, groundnut cake, maize, wheat bran and rice bran were studied. The molar percentage of acetic acid was higher when fibrous feeds were used as substrate.

Hygiene

Animal Management: The environmental factors such as air temperature, RH and air velocity of natural, evaporative cooler and fan environments and their related physiological traits on 8 crossbred cows as rectal and skin temperatures, respiration rate, dry matter consumption and water consumption during South West and North East monsoon were studied. It was found that evaporative cooler environment which was designed locally had a favourable influence on the cows in terms of comfort.

The effect of different types af creep feeding and type of flooring on the pre-weaning and post-weaning performance of yorkshire pigs were studied. It was concluded that creep feeding with standard mash gave a higher body weight up to marketing age Weaning weight was positively and significantly correlated with (r-0.59) market weight.

Therapeutics: Treatment of Bovine Babesioeis with Berenil (Hoechst): The use of Berenil was studied in 12 clinical cases of Babesiosis in cattle. The drug was found to be useful in clearing the parasites from blood. Supportive treatment was given to combat anaemia. Berenil is a good substitute for Babesan (O. C. I.) now out of market.

Study of Bovine Fever:- Bovine Fever is a common condition noted in the large animals. Clinical (Medical - Unit). studies revealed Neutrophila with shift to the left with rise in plasma sodium and fall in plasma potassium level.

Keeping quality of Bovine Blood: Keeping quality of Bovine blood was studied with a view to start a blood bank. 18 blood samples were collected from white cattle in vacuum bottles containing acid citrate dextrose solution and stored at 4° - 6°C in the refrigerator. Storage quality was assessed by the estimation of total cell count, Haemoglobin content, packed cell volume, Erythrocyte fragivity and plasma potassium levels once in three days. These studies revealed that Bovine blood could be preserved at 4-6°C for 38-41 days.

1. AGRICULTURAL BOTANY

R. 1. Ag. Bot. 101 Evaluation of germplasm of rice
Sukanya Subramaniam

During the year, 82 new types were added on to the germplasm collec-

tion. A total number of 370 short duration types was grown and harvested during *navarai* season 1976 and 2555 medium and long duration types during *samba* season 1976. Morphological description and yield components were recorded for 97 short duration types and 100 medium duration types.

R. 1. Ag. Bot. 112 Evaluation of germplasm stocks of *G. hirsutum*
A. Narayanan

735 varieties were studied for evaluation of economic traits. Among them, variety No. 112 1 was identified for combination of superior economic traits like yield and ginning per cent as compared to the check, MCU. 5. This variety is now under adaptive trials.

R. 1. Ag. Bot. 114 Development of superior cotton varieties with new plant types for irrigated areas
A. Narayanan

Culture 46 isolated with short internodes and early maturity (15 days earlier than MCU. 5) is under district trials. Among six cultures raised in preliminary yield trial, four cultures, *viz.* 2, 8, 14 and 17 were found to be better in vigour and production of bolls than the check, MCU. 5.

R. 1. Ag. Bot. 126 Screening of varieties for isolating superior types with economic attributes in germplasm bank of safflower.
N. M. Ramaswamy and B. Subba Lakshmi

Out of the 1460 varieties studied and evaluated for their yield potential during winter season (1975), 56 varieties have recorded higher yield ranging from 8.0 to 47.4 per cent over the strain K. 1.

R. 1. Ag. Bot. 201 Evolution of high yielding cold tolerant dwarf rice varieties suitable for late *samba* crop
V. Sivasubramaniam

The laboratory seedling test for cold tolerance indicated that lines with parentage of Co. 7, Co. 17, BAM. 3, Co. 32 and PVR. 1 were tolerant. Based on plant type, duration and low sensitivity to photoperiod, 20 lines were selected and subjected to field screening under fortnightly sowing from 1.9.76 to 15.12.76 to study their reaction to cold at five distinct stages : (i) seedling stage, (ii) vegetative phase, (iii) panicle initiation stage, (iv) anthesis to fertilization stage and (v) ripening stage. The harvest of first two plantings indicated that two cultures 20512 and 20516 from the cross Co. 7 x I.R. 20 are superior for cold tolerance as evidenced from their low spikelet sterility and and high productivity.

Among the existing medium duration varieties CO. 36, Vaigai and Pusa 33 exhibited cold tolerance at seedling stage.

R. 1. Ag. Bot. 205 Breeding high yielding varieties of rice with a duration of 120-140 days (mid duration) with the desired plant type and superior to the existing popular strains
J. Chandra Mohan and V. Perumalswamy

A total number of 2291 hybrid derivatives of 44 sets of crosses made between tall *indica* rice varieties and high yielding dwarf *indica* rice varieties were grown and studied in F 2 to F 5 generations. In the trials conducted with 7 homozygous hybrid derivatives with improved plant type, TNAU 4372 was found to yield 6189 kg/ha as against 5636 kg and 5853 kg recorded by Vaigai and IR. 20 respectively. TNAU. 4372 has out-yielded Bhavani and Vaigai in the farmers' holdings recording 7200 kg/ha as against 4640 kg and 4841 kg/ha obtained from Bhavani and Vaigai, respectively. This variety has been proposed for trials in the districts.

R. I. Ag. Bot. 206 Breeding and selection of rice varieties with fine and quality grains
J. Chandra Mohan and V. Perumalswamy

A total number of 871 hybrid progenies of 74 different crosses made among high yielding, slender and fine grain varieties like TKM. 6. SLO. 16, C. 2410, B.S.C. 10, RP. 4-14, Co. 36, Bhavani and Sona as well as dwarf varieties like DGWG, T (N) 1, Kannaki, IR. 24, IR. 26, and IR. 30 were grown in F_1 to F_7 generations and studied. From these, 59 homozygous superior genotypes possessing improved plant type with fine quality rice were isolated for advancing to further test. Besides, 7 outstanding selections viz. TNAU. 1590 and 1520 (IR. 26 x BSC. 10) TNAU. 1701, 1702 and 1704 (Kannaki x Bhavani), TNAU. 19193 (T(N) 1 x Bhavani) and 1756 (Bhavani x T (N) 1) possessing dwarf plant type and fine grain were identified for yield evaluation. One selection, TNAU. 4609 out-yielded IR. 20 recording more than 6 t of grain/ha with fine quality grain with high resistance to *helminthosporiose* and moderate resistance to bacterial blight. This variety has been proposed for trials in farmers' holdings.

R. 1. Ag. Bot. 207 Breeding high yielding varieties with a duration of 90 days or less with high yielding potential

A. Subramanian and T. B. Ranganathan

With a view to evolve a strain superior to Co. 39 for (i) higher total yield, (ii) higher productivity per day and (iii) better quality, a total number of 95 cultures belonging to 19 sets of crosses was studied in *navarai* 1976. Based on duration and yield potential, 47 cultures belonging to 11 sets of of crosses were tested for yield in *samba* 1976. Among these, cultures 8870, 8872 (Cul. 2410 x IR.22) recorded, 5509 and 5089 kg/ha respectively as against the yield of 3268 kg recorded for strain Co. 39.

In the trial to assess the possibility of raising four crops in a year, a total quantity of 11 tonnes of grain was obtained per hectare for a total field duration of 320 days. The trial is being continued.

R. 1. Ag. Bot. 209 Induction of mutation in rice for getting improved varieties

A. Subramanian and T. B. Renganathan

Five mutants in IR. 8, three mutants in each of Co. 32 and TKM. 6 and two in Co. 33 were under yield test. Two Co. 32 mutants viz., Co. 32-10-119 and Co. 32-20-69 were promising, yielding 29% and 21% more than Co. 32, and having the same duration as standard Co. 32. TKM. 6-20-80 continued to give higher yield over TKM. 6 by 83% and TKM. 6-0 1%. DES 115 was found to be earlier and higher yielding (69.7%) than TKM 6 parent. Among Co. 33 mutants, Co 33-93 and Co. 33-84 were found to record 36.7% and 25.3% higher yield over Co. 33.

Strains GEB. 24 and Co. 39 were irradiated with 20 KR gamma rays for study and selection of dwarf plant types with high yield potential.

R. 1. Ag. Bot. 215 Evolution of new sorghum hybrids with a duration of 85 to 90 days, superior in yield to the popular hybrids for irrigated conditions

S. Palanisamy

Among 14 new hybrids evaluated in a Preliminary Yield Trial, the combination 2219 A x 699 was found to be promising for yield.

Nine hybrids out of 131 new combinations tested were selected for further study and 192 new hybrids were produced for initial evaluation.

R. 1. Ag. Bot. 216 Evolution of high yielding varieties of sorghum suited for irrigated condition

K. Meenakshi and S. Palaniswamy

In trials laid out at the station and in the Farmers' holdings, variety UCh V.1 was identified as high yielding. It was superior in straw yield (30%) to the earlier release CSV. 4 from which it was derived by irradiation with X-rays. This medium tall variety with pearly white grains and sweet juicy stems recorded an average yield of 42 quintals of grain and 17 tonnes of straw/ha. It has a potential of over 50 quintals of grain/ha. Besides, this variety is also comparitively tolerant to shoot fly, stem borer and midge and to foliar diseases. In view of the desirable attributes, this variety has since been released as Co. 21.

Among 41 new selections tested in preliminary yield trials, 12 varieties including UChV.2, UCh.3, UChV. 5 and SPV. 37 were selected for further tests.

R. 1. Ag. Bot. 217 Evolution of new sorghum hybrids suited to rainfed areas during monsoon season
S. Palaniswamy and P. Vaidyanathan

Among the ten new hybrid combinations tested in an advanced yield trial, the hybrid combination 296 A x CS. 3541 has recorded 78.3 quintals of grain and 12.7 tonnes of straw/ha as against 77 quintals of grain with 15.8 tonnes of straw recorded by CSH. 5. Fifty eight hybrids were evaluated, out of which six were selected for further studies. One hundred and three new hybrid combinations were also compared in single row plots for identifying superior combinations. One hundred and sixty new crosses were effected between 14 male sterile lines and promising elite lines. Fourteen male sterile lines were maintained.

R. 1. Ag. Bot. 222 Development of *cumbu* hybrids superior to HB. 3 and HB.4 with a duration of 85-90 days
V. K. Kunjamma and R. Subramanian

The new *cumbu* hybrid combination UCH.4, in an irrigated trial has recorded 31 q/ha of grain as against 19 q/ha of the standard KM. 1 (with an increase of 64%). In All India Co-ordinated Trial grown under irrigated condition, UCH.4 has recorded 32q/ha as against 21q/ha and 19.5q/ha by KM.1 and PHB-14 respectively, the percentages of increase being 50 and 64 respectively, over KM.1 and PHB.14. Under rainfed conditions in 1976-77 (a droughty year), UCH.4 gave 9 quintals of grain/ha as against 6.6 quintals by KM.1. In five initial trials with new hybrids, UCH.4 stood superior in grain yield to KM.1 (the average increase being 48.7%). Also, it was free from downy mildew in all trials.

R. 1. Ag. Bot. 230 Evaluation and selection of superior hybrids and varieties of maize suited for irrigated conditions
S. Thangavelu

One pop corn hybrid 2418x2410 gave significantly increased yield of 32% over local during the main season with 36 q/ha as against 27.3 quintals. The same hybrid has performed consistenty superior to local during the last three seasons also. The over all mean yield is 41 q/ha as compared to 23.7 quintals in local (i.e. 70% increase).

R. 1. Ag. Bot. 231 Evaluation and selection of superior wheat varieties suited for multiple cropping programme
S. Thangavelu

A short duration mutant of 90 days duration was identified in M2 progenies of gamma irradiated NP. 200, *samba* wheat of 125 days duration.

R. 1. Ag. Bot. 236 Breeding of short duration varieties of American cotton (*G. hirsutum*) for rice fallows
S. Kamalanathan and C P. Thiagarajan

One promising culture viz R.F. 14 which recorded, on an average, 29% increased yield, 2.5% higher ginning per cent over MCU.7 has been advanced to district trial. Two cultures in main strain trial and ten cultures in preliminary strain trial had shorter duration combined with better economic traits than MCU.7.

In mutation breeding, 820 single plants in M 3, 820 single plants in M2 (R) and 540 single plants in M 2 were studied and economic mutants were selected.

R. 1. Ag. Bot. 238 Inter-specific hybridization within cultivated tetraploid species of *Gossypium* for creating new potential of quantitative and qualitative value
P S. Chandramathi

Two inter-specific hybrids, namely TNH.3 identified under this project recorded kapas yield of 13 and 14 q/ha as against 11 q/ha recorded by CBS. 156. These hybirds possessed 2 mm longer mean halo-length than CBS. 156 (32 mm). In fibre qualities like strength and fineness, it equlled CBS. 156. To assess the comparative yield performance in the different tracts, 24 trials have been laid out in the districts of Coimbatore, Salem and Madurai.

R. 1. Ag. Bot. 240 Evolution of short duration bunch strains of groundnut suitable for low rainfall areas and rice fallows
A.N. Venkateswaran and V. Muralidharan

The bunch groundnut pureline Ah. 8188, with a duration of 105 days was consistently superior to POL.2, yielding higher by 16% in comparative yield trial and by 12% in Co-ordinated Varietal Trial of 1976 summer. As a rainfed crop the yield increase was 8 to 12 per cent. Considering four summer and three rainfed seasons, this culture gave respectively an average increase of 16 and 20 per cent over POL. 2 and 3 and 20 per cent over TMV.9. In shelling percentage, Ah. 8188 was slightly higher than POL.2, and by 3 per cent over TMV.9.

R. 1. Ag. Bot. 242 Evolution of short duration strains of gingelly with wide adaptability for irrigated areas
A. N. Venkateswaran and N. Sundaram

The culture Si. 1855/1 recorded a seed yield of 438 kg/ha which was 25 per cent higher than that of TMV. 3 in comparative yield trials of summer, 1976. In the over all performance for three summer seasons, this culture yielded 709 kg/ha, recording an increase of 13 per cent over TMV. 3 (631 kg/ha).

R. 1. Ag. Bot. 269 Improving the plant type and yield potential of PVR. 1 and Co. 25 rice
S. Palaniswamy

A promising culture, TNAU. 13493 of cross IR. 8 x Co. 25, with a duration of 165-175 days, with desirable plant type, capable of yielding, on an average, 6 tonnes of grain per hectare and suitable for cultivation in *samba, thaladi* or *pishanam* seasons, was released as Raja Rajan-Co.40 in order to replace Co. 25 in Thanjavur and other regions. Further, a large number of cultures of various sets of crosses with PVR. 1 and other parents with improved plant types are under different stages of trial.

R. 1. Ag. Bot. 290 Evaluation of safflower varieties and selections for their performance under yield trial
N. M. Ramaswamy

Three pure line selections viz. CTS. 7205, CTS. 7218 and CTS. 7403 (nonspiny) have recorded increased yields of 16, 20 and 14% respectively over the control K. 1. These selections have been included under All India Co-ordinated Varietal Trial during 1976 winter season. Among them, selection CTS. 7218 continued to maintain its superiority in yield in both winter and summer seasons yielding 869 kg/ha as against 722 kg/ha from K. 1 (Control), showing an increase of 20%. In the district trials also, conducted at nine centres in Coimbatore district during winter 1975 season, it has recorded 16% higher mean yield over K. 1.

R. 1. Ag. Bot. 293 Study of variation within varietal populations for isolating elite plants in sunflower
G. Purushothaman and M. Subramanian

A sunflower variety "Improved 101495" has been developed from the Russian variety Cerjenka 66. The improved variety was tested for its yield and other traits in comparison with the popular variety, EC. 68413, under cultivation. The improved variety is short-statured (135 cm) and has a duration of 75 days, as against 90 days duration of EC.68413, with a mean height of 160 cm. The variety 101495 gave a mean yield of 21.3 q/ha, while EC. 68413 gave 19 q/ha; the increase being 12.0% over the control. The mean per day productivity of the improved variety was 28.4 kg/ha compared to 20.9 kg/ha of EC. 68413.

R. 1. Ag. Bot. 297 **Evolution of high yielding and early maturing varieties of redgram through mutation breeding**
N. Mohamed Sheriff

Redgram mutant S 18 developed from Co. 1, through EMS (0.6%) treatment has substantiated its superiority by recording 17.3 and 20.6 q/ha during summer 1976 and monsoon 1976 respectively, representing an increase of 38% and 78% over Co. 2. Considering the consistent superior yield of S. 18 combined with better seed quality and resistance to root-rot disease, it was released as Co. 3 in January 1977. On an average, Co. 3 yields 14 q/ha under irrigation and 12q/ha under rainfed condition, with 34% and 66% increase over Co. 2. The duration of Co. 3 is 130 days. Rainfed crop of Co. 3 gives an additional profit of Rs. 900/- per hectare over Co. 2 while as an irrigated crop it gives an additional income of Rs. 600/- per hectare over Co. 2. Since redgram is widely grown as a rainfed crop, Co. 3 is eminently suited for dryland farming.

R. 1. Ag. Bot. 298 Evolution of a high yielding variety of blackgram with improved plant type for cultivation in (i) dry lands, (ii) garden lands and (iii) rice fallows
A. Ayyamperumal

BP. 3, a reselection from a local Musiri variety was tested in research stations and in district trials under rainfed as well as irrigated condition. The selection with 75 days duration has an yield potential of 6 and 11 q/ha as against 5 and 10 q/ha for Co. 3 under rainfed and irrigated condition respectively. BP. 3 besides being early by 15 days, has given per day productivity of 9.4 kg per hectare as against 7.5 kg per hectare for Co. 3 under rainfed condition. BP. 3 is resistant to diseases like root rot, tip blight, and phyllody and and also to pest like stem borer.

In the comparative yield trial, out of 21 selections from three cross combinations tested, two selections viz. C.4-452/2 and C. 5-61/1 recorded 14 q/ha under rainfed condition. Selection C. 5-61/1 consistently recorded higher yield than Co. 3 in the past two seasons.

R. 1. Ag. Bot. 299 Development of short duration varieties of blackgram with yield potential through mutation breeding
A. Ayyamperumal

Blackgram Mutant 3, a MMS (0.02%) mutant of Co. 1 blackgram maturing in 70 days was tested in yield trials both in the research stations and in the district trials under both irrigated and rainfed conditions. It yields 12.5 q/ha under irrigated condition and 8 q/ha under rainfed condition, representing an increase of 31% and 23% respectively over Co. 2. Compared to Co. 3, Mutant 3 is earlier in duration by 15 days while on par in yield.

R. 1. Ag. Bot. 300 Synthesis of a new variety of vegetable - cum - grain purpose lab-lab with earliness and drought resistance

K. Mahudeswaran and P. Rangaswamy

An early and economic natural mutant lab-lab (*Dolichos lab-lab* Var. *typicus*), derived from kitchen garden type (MS. 9867), was compared along with standard strain Co. 8 lab-lab during *rabi* 1976 and *kharif* 1976. During *rabi* 1976, it has registered 70 quintals of green pods ha with significant increased yield of 36% over Co. 8 lab-lab. In *kharif* 1976, it gave 73 quintals of green pod with significant increased yield of 63% over Co. 8 lab-lab. As an irrigated crop it yields, on an average, a net profit of Rs. 3800/ha. Its other features are : (1) Being Photo-insensitive, it is suitable for cultivation all round the year; (2) Its pods are broad, light green, flat and tasty with better cooking quality. It has better consumer preference and (3) Its bushy habit with shorter crop life (120 days) helps for inclusion in multiple or mixed cropping. Hence, this has been released as Co. 9 in January 1977.

R. 1. Ag. Bot. 303 Evolution of an early maturing and high yielding strain of bengalgram through hybridisation and mutation breeding

S. Iyemperumal and S. Giridharan

In bengalgram, the selection, PLS. 10 has consistently given superior performance over Co. 1, the standard, for five seasons in the University campus, for two seasons in the University Research Stations and for three seasons in the scattered block trials conducted in Coimbatore district in 29 farmers' holdings. The overall performance revealed that PLS. 10 had recorded 10.3 quintals as against 8.7 q ha for Co. 1, thus giving an increase of 19%. The per day productivity per hectare for PLS. 10 and Co. 1 were 11.8 and 9.7 kg respectively with the same cropping period. The increased net return of PLS. 10 over Co. 1 is Rs. 345/- per hectare.

R. 1. Ag. Bot. 304 Development of an early maturing vegetable-cum-grain purpose cowpea suitable for both irrigated and rainfed conditions by hybridisation and mutation breeding

S. Iyemperumal and S. Giridharan

Two selections namely PLS. 25 and PLS. 370 were consistently found promising over Co. 2 in the trials conducted at the University campus over the six seasons, at University Research Stations for three seasons and in 33 district trials. The overall performance had indicated the superiority of these two selections, PLS. 25 and PLS. 370 over Co. 2 recording 9 and 8.5 q/ha respectively, an against 7.4 quintals for Co. 2, thus showing increase of 22% and 15% respectively over Co. 2. Besides, PLS. 25 and PLS. 370 have a duration of 75 and 60 days, respectively compared to 80 days for Co. 2, thus recording a per day productivity of 12 and 13 kg respectively against 9.3 kg for Co. 2.

The increased monetary return of the above two selections over Co. 2 are Rs. 490 and Rs. 330/ha respectively.

In the evaluation of cowpea varieties for vegetables, the selection Co.2/1 consistently gave high yield over Co. 2 for five seasons. Co. 2/1 had given a mean hectare yield of 54 quintals as against 46 quintals of green pods for Co. 2, with the same duration, and recording an increase of 18%. The per day production per hectare is 63.7 kg while that of Co. 2 is 54 kg only with an increased monetary return of Rs. 407/ha.

R. 1. Ag. Bot. 311 Evaluation of germplasm stocks of sunnhemp (*Crotalaria juncea*)
W. Mohamed Ali Khan

A total number of 63 germplasm stocks was evaluated. Variety 'Ayakudi' gave the highest fibre yield of 8.2 g/five plants.

In 'Bapatla local' 18.7 tonnes of greens/ha were obtained. In decomposition it adds 99 kg of N/ha which is 37% more than that of 'Coimbatore Local. It is estimated that by growing variety 'Bapatla local' as green manure crop about Rs. 120/- per hectare may be saved towards organic N. The number of root nodules per plant was also higher in 'Bapatla local' (27) when compared with Coimbatore local (10).

R. 1. Ag. Bot. 322 Creation of wide spectrum of variability in groundnut varieties through induced mutations for evolution of improved types
R. Rathnaswamy

Five groundnut varieties viz., TMV. 1, TMV. 7, TMV. 9, POL. 1 and POL. 2 were subjected to mutagenic treatments with gamma rays, EMS, MMS, SA and combination treatments. Thirteen bunch mutants induced from the variety POL. 1 were evaluated in comparative yield trial. Mutant 6914 induced by 0.04 per cent EMS gave the highest mean yield of 27.4 q/ha and 38.6 q/ha under rainfed and irrigated conditions respectively, recording an increase of 40% and 14% over the ruling strain POL. 2.

Four semi-spreading mutants from TMV. 10 evolved by gamma irradiation have been identified and are now in comparative yield trials. These mutants recorded yield increase of 23 to 44 per cent over TMV. 10 during summer, 1976.

Four hundred lines derived from gamma irradiation and chemical mutagen treatments have been evaluated in M 4 generation and 1000 single plants have been selected for further study.

R. 1. Ag. Bot. 335 Evolution of a superior variety of jute in yield and quality of fibre
W. Mohamed Ali Khan

Among 30 germplasm stocks studied, variety JRO. 878 was the tallest (260 cm) with highest fibre yield (65 g/5 plants).

Seed yield in jute varieties indicated the possibility of growing a seed crop of jute under Coimbatore conditions successfully. JRO.878 and JRO.7835 gave eight to nine quintals of seed/ha while JRC. 7447 gave seven quintals in 120 days.It is estimated that a net profit of about Rs. 2500/- to Rs. 3000/- per hectare may be obtained by growing jute as a seed crop.

R. 1. Ag. Bot. 354 Breeding cotton varieties with multiple resistance to pests and diseases with tolerance to drought
S. Kamalanathan, M. Kadambavanasundaram, Thangamani Narayanaswamy and Chellammal Murugesan

A total number of 465 cotton varieties belonging to *G. hirsutum* was screened for resistance for pests and diseases and tolerance to drought. None of them were resistant to sucking pests of cotton. Amongst *barbadense* varieties tested for bacterial blight, CBS. 25, CBS. 34 and ERB. 4492 were found to be tolerant.

Based on relative water turgidity test, 298 were assessed to be tolerant to drought.

R. 2. Ag. Bot. 101 Improvement of onions by induced mutagenesis, selection and hybridization
V.D. Guruswamy Raja

The trial conducted during October 1976 has shown that S.6 and AC.7, selections from Sempatti local have recorded significantly higher bulb yield of 16.1 and 15.0 tonnes/ha respectively against 12.2 tonnes of Co.2. The increase of yield over Co.2 thus ranged from 23 to 32%. Further, the duration of the promising selections was 70-75 days only against 85-90 days of Co.2.

R. 2. Ag. Bot. 201 Incorporation of superior plant type and hardiness for higher yield in cultivated rice through hybridization
S. Sivasubramaniam

Seven high yielding rainfed cultures of the cross IR.8 x Chitraikar, were tried in an observational trial against Vaigai and IET.1444 as standards. All the seven cultures were found to record higher yield ranging from 3.69 to 4.61 t/ha as against 3.63 tonnes of Vaigai and 3.21 tonnes of IET. 1444. The culture 313-11-2 registered the maximum yield, with an increase of 46.7% over IET. 1444 and 26.9% over Vaigai. These cultures were advanced to

scattered block trials in 26 centres in Ramanathapuram and Tirunelveli districts against suitable local standards. Twenty three cultures of IR.8 x Chitraikar parentage were screened for drougt resistance by D Mannitol test and the cultures 314-47-1 and 291-15-4 were found to be highly resistant.

R. 2. Ag. Bot. 203 Evolution of high yielding and indehiscent white seeded gingelly strain (*Sesamum indicum L.*) with high oil content and drought tolerance
G. Soundarapandian

Nine selections from germplasm were tested for their yield potential Selection AC 86 has recorded maximum yield of 363 kg/ha while TMV.2, TMV. 3, KRR.1 and KRR.2 have recorded 242, 230, 210 and 113 kg/ha respectively. Selections AC 44 and AC.45 are also found to be promising with 246 kg and 232 kg of seed yield per hectare.

In the hybridisation programme, 37 F4 progenies of ten cross combinations and 26 F5 progenies of the cross TMV.2 x Yanamalai wild, were advanced for row yield trials.

In the mutation breeding programme, 191 progenies of TMV.2 treated with gamma rays have been advanced to M4 generation for testing their yield potential.

R. 2. Ag. Bot. 204 Studies on the improvement of bhendi, suited to Madurai area through selection and breeding
G. Soundrapandian and V. Thandapani

Mutant selection MC. 105 was tested under yield trial in six centres at Research Stations and in ten centres on farmers' fields of southern districts of Tamil Nadu, along with the standard Pusa sawani. In these trials, MC. 105 has recorded on an average, 9024 kg of green pods ha while Pusa sawani has recorded 7422 kg/ha, thereby showing an increase of 21.6% over the check. The mutant selection is being tested in more number of scattered block trials in the districts.

Fifty six selections from the BC F4 backcross progenies of the cross Pusa sawani x (Ex Ghana-XPusa Sawani) showed resistance to vein clearing disease and further screening is in progress.

R. 2. Ag. Bot. 205 Evolving superior mutants of *Capsicum* through induced mutagenesis
R. Sethupathi Ramalingam

The results of the trials conducted with the chilli mutants at the University Research Stations and on cultivators' holdings in the districts of Madurai, Ramanathapuram, Tirunelveli, Tiruchirapalli, Tanjore, Pudukkottai and

Coimbatore during the past three years revealed the superiority of the cluster flowering mutant (Culture 1) over K.1 and K.2 recording 20 per cent and 15 per cent increased yield respectively. Culture 1 was, therefore released as MDU.1 for general cultivation. On an average, it gives an yield of 1809 kg/ha as against 1553 kg/ha. by K.2 resulting in an extra income of Rs. 1300/ha. Its fruits are long, shiny red in colour and more pungent due to higher Capsicine content by 0.2 mg per gram of dry fruit than K 2. The irradiated progenies of MDU.1 are being screened for identifying early types combining the yield potential.

R. 2. Ag. Bot. 208 Evolution of short duration non season bound, high yielding strains in redgram (*cajanus cajan* L. Mill sp.)
R. Sethupathi Ramalingam and N. Sivaswamy

The selection SPS. 12 recorded 1575 kg of grain/ha against Co. 2 with 1225 kg/ha, representing an increased yield of 28.5 per cent. The superiority of this strain is being assessed by conducting multi-location trials at University Research Stations.

The sixteen mutants, possessing compact plant type and increased yield (isolated from Co. 1 and Co. 2) were advanced to row tests to assess their breeding behaviour and yield potential.

R. 2. Ag. Bot 216 Evolution of improved varieties of greengram adapted to the agro-climatic situations in the Southern districts of Tamil Nadu
P. V. Marappan and G. Balasubramaniam

Twenty one varieties including the local checks Co. 2 and Co. 3 were tested for their comparative performance. Variety PH. 11 was earlier than Co. 3 by 3 days in 50% flowering. The yield differences were found to be significant. As compared to Co. 3 with an yield of 1276 kg/ha, varieties PIMS. 1 and PH. 11 gave four and 13 per cent increased yield respectively.

R. 3. Ag. Bot. 203 Evaluation of promising selections of greengram
V. P. A. Rajasekaran and K. Mohanasundaram

Under irrigated conditions, Co. 3 greengram out yielded the other three varieties Co. 1, Co. 2 and M 2 by recording highest mean yield of 2240 kg/ha and the mean yield increase was 27.07% over Co. 1. Under rainfed conditions M 2, the mutant derivative of Co. 1 greengram recorded the highest mean yield of 855 kg/ha and the mean yield increase was 7.04% over Co. 1.

R. 3. Ag. Bot. 207 Evolution of high yielding varieties and hybrids of cholam suited for cultivation in Lower Bhavani Project area
V. P. A. Rajasekaran and K. Mohanasundaram

The yield differences between eleven hybrids tested in Sorghum hybrid trial in comparision with CSH. 1, 5 and 6 were significant and the hybrid SPH. 10 recorded the highest mean yield of 6513 kg/ha, registering a mean yield increase of 17.71% over CSH 6.

R. 5. Ag. Bot. 201 Evolution of high yielding bunch groundnut strains superior to the existing ones
C. Surendran, T. Ramanathan, R. M. Chandrasekaran and C. Palaniswamy

In the first set of comparative yield trials, three out of five cultures tested viz., Ah. 8407 (USA), Ah. 8180 (Greece) and Ah. 8446 (TMV. 2 x Ah. 7821) recorded increased yields of 57.8, 56.8 and 44.9 per cent over POL. 1 respectively. In the second set of comparative yield trials three out of four cultures Ah. 8462 and Ah 8460 (Jabalpur) and Ah. 8451 (TMV. 2 x Erecta) gave 14.4, 10.8 and 7.1 per cent increase over POL. 2 respectively. Culture Ah. 8451 has small pod and kernels and found to be tolerant to drought. The seed rate requirement in this variety is less because of small seed size.

R. 5. Ag. Bot. 203 Induced mutation in groundnut
C. Surendran, T. Ramanathan, R. M. Chandrasekaran and C. Palaniswamy

Forty four mutant cultures selected from M 5 generation were tested in row test. Three of them viz., SPS. 5903 (POL. 1, 40 KR), SPS. 5904 (POL. 1, 40 KR), and SPS. 5906 (TMV. 10, 20 KR) recorded increased yields of 17.7, 22.8 and 21.2 per cent respectively over TMV. 10 (standard).

In M 1, M 3, and M 4 generations 1294, 8503 and 4931 plants were grown to maturity and of which all the plants in M 1, 581 in M 3 and 65 plants in M4 were selected for further study. The selections in later generations were based on earliness, high pod yield and uniform maturity.

R. 5. Ag. Bot. 206 Seed multiplication an evaluation of progenies of crosses, cultures and varieties of groundnut from various participating centres under All India Co ordinated Research project on Oilseeds
P. Sivasubramanian, V. Mylswami, M. Stephen Dorairaj, K. B. Anandakrishnan, and S. Panneerselvam

Among 35 bunch varieties tried in the advanced yield trials during *Kharif* 1976, the two mass selections viz., OSN. 1 and OSN. 2 did not show much promise and their yields were on par with that of the control POL. 2. From the results obtained from a second set of yield trial, it was observed that selections OSN. 3 and OSN. 6 registered an yield increase of 6.0 per cent and 11.9 per cent over POL. 2. In another set of yield trial, cultures X. 112-2,

X. 1193-A and X. 1187-A excelled the strain POL. 2 registering 10.4 per cent 8.4 per cent and 8.0 per cent increased yield respectively, and these cultures were also found to be drought tolerant. Besides, 37 varieties under row trial were evaluated on the basis of 1000 plants yield and 17 of them recorded higher yield than the standard. Under seed multiplication programme, 45 groundnut entries received from seven centres were multiplied and a quantity of 662.145 kg of seed pods were supplied.

R. 8. Ag. Bot. 201 Evalution of high yielding rice varieties for Krishnagiri Reservoir project area
C. Murugarajendran and M. Suresh

High yielding cultures viz., IET. 2508, 2501, TKM. 6 (M), 14562, 131616, 5202, 8243, 8241 and 8244 which proved their superiortity during the earlier tests were forwarded to advanced stage of trial for conclusive results. These were raised during main season along with four existing strains, viz., Bhavani, Jaya, IR. 20, Kannagi and ADT. 31 in two series based on duration. In first set, culture 8241 recorded significantly superior yield of 4450 kg/ha representing 26.5 per cent increase over to ADT. 31 which recorded 3518 kg/ha. Culture 14562 which was the earliest to mature (95 days), however, recorded low yields. In the second set, 2501, 5202, IR 20 and Jaya recorded significantly high yields viz., 4615, 4311, 4340 and 3600 kg/ha respectively over Bhavani which gave 2725 kg/ha. The highest yielder registered 69.4 per cent increased yield over the control.

R. 8. Ag. Bot. 208 Evoluion of early maturing, drought resistant, medium staple cotton for harsh ecological zones of Tamil Nadu
G. A. Palaniswamy, R. Nagarajan and N. P. Velumani

Among the 12 selections tried TKX. 1, CH. 4 and CRH. 71 had combinations of high yield with good ginning outturn in winter 1975. During summer 1976, a total of 91 types obtained from Srivilliputhur was compared in yield trials under irrigation in three sets along with controls MCU. 5, MCU. 7 and MCU. 8. None of the selections excelled MCU. 8, which recorded an hectare yield of 1,861 kg with a ginning per cent of 35.

R. 9. Ag. Bot. 201 Uniform variety trail for early rice varieties
K. M. Balasubramaniam and S. Krishnaswamy

In the uniform variety trial series I, of the sixteen high yielding cultures, two cultures IET. 2361 (IR. 8/N. 22) and IET. 2685 (TKM. 6/TN. 1) with long slender grain and a total duration of 100 and 90 days respectively yielded as much as ADT 31 in *Kuruvai* season. In series II, of the twenty four cultures under study, two cultures IET. 4111 (RPA. 5826) and IET. 4556 (IR. 30) with total duration of 96 and 107 days respectively registered slightly higher yield than Ratna (1875 kg/ha) and double the yield of Cauvery (1737 kg/ha). Of the

eighteen cultures tried in series III. Cultures IET. 2993 (Riku 132 N.22/SR.26B) with a duration of 120 days recorded 5032 kg ha of grain yield, 42% higher than the yield of Java in *Kuruvai* season.

R. 9. Ag. Bot. 213 Breeding short term rice offering resistance to Hydrogen sulphide root injury coupled with ill-drained situations
K. M. Balasubramaniam, S. Krishnaswamy and V. Subbiah

Hybridization work involving fairly resistant parents for hydrogen sulphide root injury viz., Tiruveni, IR. 28 and IR.30 on one hand and popular rice varieties like ADT 9, Vaigai, Co 39 and ADT 31 on the other was carried out during *kuruvai* season of 1975. A total of 27 hybrids was fixed in eleven cross combinations in summer 1976. The F population of these cross combinations was screened under the soil conditions existing at the State Seed Farm, Miralur during *kuruvai* season of 1976 77. A total number of 71 single plants based on location test technique were selected in seven cross combinations for further test in the field.

R. 10. Ag. Bot. 204 Calibration of existing adult palms in the plantation
S. D. Peter and C. Jayaraman

The study of the yield data of 1600 palms which received uniform cultural, manurial and irrigation treatments for the past eighteen years revealed during this year that 12.5 per cent palms have yielded more than 80 nuts per palm, 26 per cent of the palms having 41 to 80 nuts, 25 per cent of the palms producing 21-40 nuts and 22% of palms giving below 20 nuts due to the inherent genetic character. The palms yielding more than 100 nuts were marked and palm No. 1420 and 1422 were the best available mother palms in the station under the project combining the yield and quality of nuts with the desirable palm characters.

R. 15. Ag. Bot. 201 Varietal trails in groundnut
T. K. Ramachandran, S. T. Natarajan and
M. R. Sathiamurthy

Thirty bunch varieties from seven States (twelve in early and eighteen in late groups) were tried during *kharif* 1976. The varieties Robout 38-1 (AP) and Ah 8358 (Tamil Nadu) stood first in early and late groups recording 569 and 582 kg/ha with yield increase of 25.6 and 5.4% respectively over POL 2. High economic shelling of 70% was observed in variety MGS. 9 (Mysore). Ten varieties from four States were evaluated. TMV. 10 (Tamil Nadu) recorded the highest yield of 613 kg/ha followed by X40-XX-3B (472 kg) of A. P. These two were significantly superior to others. The spreading variety from Kadiri (AP) viz., X-7-2-3-1-12 B was highly tolerant to diseases especially to tikka, rust and root rot. It yielded only 277 kg/ha. Nine bold seeded varieties from four States with an introduction from Israel viz., Shulamit were tested. The

yield differences were highly significant. M. 13 (Punjab) a spreading variety recorded significantly highest yield of 584 kg/ha with 128.1% increase over the general mean. Shulamit recorded only 69 kg/ha. It was also susceptible to rust and other diseases. The Lurch entries viz., TG. 3 and TG. 14 were superior to rest of seven varieties recording 60.5% increase over the general mean.

R. 15 Ag. Bot. 203 Hybridization in groundnut
T. K. Ramachandran, S. T. Natarajan and
M. R. Sathiamurthy

A total of 26,788 flowers were crossed during *kharif* 1975 involving 39 cross combination (consisting of 3 habit groups) and 3349 hybrid pods obtained working out a setting of 10.2%. The percentage of pod set was more than 20% in the crosses viz., X1246 (M. 13 x Ah. 8254) x 1238 (TMV. 10 x Gangapuri); X1241 (Ah. 8254 x TG. 14)., X1249 (TMV 10 x USA. 86), X1251 (TMV. 10 x M. 13), X1252 (M. 13 x TMV. 10) and X1290 (Ah. 8254 x US. 52).

With regard to percentage of hybrids realised to flowers crossed, more than 5% hybrids was realised in the cross X1277 (Gangapuri x TMV. 10), X1245 (Ah. 8254 x M. 13) X1247 (Ex. 1-1 x FC. 76446), X1269 x (Ah. 6279 x TMV. 10) and X1272 (RS. 138 x TMV. 10).

A total of 561 F1 hybrids have been harvested for further study. One hundred and ninety seven F2 and 257 F3 selections were carried forward from the progenies of crosses involving 14 cross combinations.

R. 15. Ag. Bot. 206 Varietal trials in sesamum
T. K. Ramachandran, S. T. Natarajan and
M. R. Sathiyamurthy

Out of the five mutants developed from KRR. 2 the three viz., 36-1-1, 40-1-1 and 41-1-1 were found to be highly tolerant to powdery mildew at Coimbatore.

The mutant 40-1-1 has 2.13% higher oil content (50.66) over TMV. 2 (48.53%). KRR. 2 recorded only 47.78% oil.

R. 16. Ag. Bot. 201 Breeding of early and uniform maturing types of castor
N. Sundaresan and AR. Muthiah

Thirteen out of fourteen selections tried have recorded increased mean yield of 7.2% to 97.7% over the standard SA. 2 in a replicated row trial during 1976 *kharif*. From the F3 progenies of 90 selections 15 single plants recording 13.5% to 65.9% yield over the check SA. 2 were selected. Seven plants from F2 with desirable economic attributes were selected. Selfed seeds

from 11 F1 populations were collected for further study of the segregating population. Fresh crosses of both straight and reciprocal were attempted between SA. 2 and ten selected short duration inbreds. Seventeen crosses were successful and the hybrid seeds were collected.

R. 16. Ag. Bot. 202 Induced mutation in castor
N. Sundaresan and M. Syed Sulaiman

From the M2 progenies of gamma ray irradiated TMV. 1 castor, 11 desirable mutants recording 21.7% to 181.9% increase in yield over the strain TMV. 1 were isolated for further study in M3. Similarly four mutants from TMV 2 recording 25.5% to 71.0% increase, five mutants from TMV. 1 100% pistillate recording 11.1% to 67.7% increase and two mutants from RC. 539/1 recording 1.7% and 58.2% increase in yield over their untreated standard strain were isolated for forwarding to M3. Nine desirable mutants from M3 population of gamma ray treated SA. 1 recording upto 45.6% increase in yield over SA 1 were earmarked for further testing in M4.

R. 16. Ag. Bot. 203 Evolution of high-yielding hybrid castor
N. Sundaresan and M. Syed Sulaiman

The top cross hybrid x 1101 (RC. 1296 x TMV. 1) was found to be significantly superior over the standard TMV. 1 by recording 78.7% increase in yield. Among the nine double cross hybrids tested, the double hybird x 1151 has recorded significantly superior yield registering 22.8% increase over TMV. 2. Twenty five successful crosses have been made between 14 selected F_1s to study the double cross hybrids. None of the hybrids between TMV. 1 100% pistillate and five inbreds proved to be a maintainer line for the pistillate character. Eight fresh crosses have been made for isolation of a maintainer line for the pistillate character. Ten crosses were successfully made between TMV. 1 100% pistillate and ten extra state varieties to assess the combining ability of these varieties.

R. 17. Ag. Bot. 205 Evaluation of breeding materials/germplasm and selection of promising greengram varieties
C. Nagarajan and V. Panneerselvam

Among the ten greengram varieties tested, ML. 9. recorded the highest yield of 852 kg/ha which is 64% higher than the yield of Baisaki mung (Anjugam). This variety was statistically on par in yield with M. 2, Co. 1 and S. 8 with yields of 793, 739 and 729 kg/ha which are 53, 42 and 40% respectively higher than Baisaki mung.

R. 17. Ag. Bot. 206 Evaluation of breeding material germplasm and selection of promising blackgram varieties
C. Nagarajan and V. Panneerselvam

Among the ten blackgram varieties tested, Co. 3 recorded the highest yield of 826 kg ha followed by M. 3. with 809 kg ha which are 19 and 16% higher than the yield of T. 9 blackgram.

R. 17. Ag. Bot. 208 Evaluation of breeding materials/germplasm and selection of promising cowpea varieties
C. Nagarajan and V. Panneerselvam

Among the ten cowpea varieties tested, C. 152 recorded the highest yield of 954 kg ha followed by Co. 2 with an yield of 928 kg/ha and C. 153 with 913 kg/ha while the others recorded yields from 767 to 819 kg ha.

R. 17. Ag. Bot. 216 Development of superior hybrids of American cotton under rainfed condition
N. Sundaram and K. Natarajan

Three hybrids viz. TKX. 1, CPH. 4 and CPH. 2 were tested against Bharathi (MCU. 6) under rainfed conditions. The hybrid TKX. 1 recorded an yield of 215 kg/ha as against 173 kg/ha recorded by Bharathi. TKX. 1 was also found to be better than Bharathi in ginning outturn (38.0% in TKX 1 and 37.8 in Bharathi) but poorer in mean halo-length.

R. 17. Ag. Bot. 218 Search of resistance sources for jassid incidence on rainfed American cotton and breeding jassid resistant varieties
N. Sundaram and K. Natarajan

Among the 20 varieties and cultures evaluated for jassid injury under unprotected condition, the SRT-1, C. 50, GS. 23 and LH. 299 recorded a mean grade of I as against grade II recored by Bharathi (MCU. 6). Under unprotected condition the culture C. 50 evolved at this centre recorded an yield of 216 kg/ha as against 16 kg/ha recorded by Bharathi.

R. 17. Ag. Bot. 219 Identifying resistance source for black arm disease in rainfed American cotton and utilization in the breeding of resistant varieties
N. Sundaram and B. Ramaraj

A study of the rating in the germplasm collection for black arm disease infection under artificial epiphytotic conditions revealed that the two varieties IC. 1430 and project 38 were found to be immune for the disease.

R. 17. Ag. Bot. 220 Evaluation of breeding materials germplasm and selection of promising *bajra* varieties/hybrids
C Nagarajan and V Panneerselvam

Four varieties and six hybrids were compared. Of these, the variety UCV. 1 recorded the highest grain yield of 1289 Kg ha followed by the variety composite 2 and the hybrid UCH. 1 with yields of 936 and 898 kg/ha respectively.

R. 18. Ag. Bot. 202 Studying the efficacy of NAA on the boll retention of cotton
S R Chowdappan, N Balasubramanian and R M Kasi viswanathan

There was no significant differerence in initial stand, plant height at flowering and harvest stage. In the mean number of fruiting points and boll numbers, 10 ppm and 20 ppm planofix sprayed 3 times at 10 to 15 days interval recorded the maximum (21.3 boll/hill). The highest yield of seed cotton (2,360 kg/ha) was recorded in treatment of planofix 30 ppm at flowering and another 20 ppm 15 days after the first spray. This was closely followed by 20 ppm NAA sprayed (2,339 kg/ha) and 10 ppm NAA (2,103 kg/ha) at 10-15 days interval three times with planofix.

The additional cost involved in spraying 30 ppm NAA at flowering and 20 ppm 15 days after the first spray with planofix was only Rs. 64/- per hectare which adequately compensates in yield of seed cotton.

R. 18. Ag. Bot. 205 Breeding a hirsutum variety of cotton superior to MCU. 8 suitable for summer cambodia tract of Tamil Nadu
A. D Devotta, N Subbaraman and S. Manivannan

In Main Strain Trial, the culture ELO. 575 has given higher yield of 1609 kg/ha by MCU. 8. It has also combined superior attributes for length, ginning, lint index and seed index. This culture has been taken for preliminary varietal trial for testing its performance in other centres.

R. 19. Ag. Bot. 209 Varietal trials for introducing a suitable variety of cotton to replace MCU. 7
M. Vaman Bhat and R. Rajagopalan

In the preliminary varietal trial conducted at Aduthurai, among the five cultures tested against MCU. 7, Krishna SVPR. 124 and SVPR. 134 were found to be promising as they were statistically on par with MCU. 7 and Krishna in earliness, yield potentiality and ginning outturn but significantly superior to MCU. 7 and Krishna in mean halo length. SVPR 124 and SVPR. 134 recorded 26.4 mm and 27.1 mm respectively as against 23.8 mm of MCU. 7 and 23.7 mm of Krishna.

In the Co-ordinated Varietal Trial conducted at Aduthurai, 12 cultures were tested against MCU. 7 and Krishna. Among these, six cultures were tried for three years in succession against MCU.7. Culture SPVR.75 was found to be promising. It equalled MCU. 7 in yield potentiality and ginning out-turn but superior to MCU. 7 in mean halo length statistically. Over the three years, SVPR. 75 recorded a mean lint yield of 450 kg ha. mean ginning out-turn of 34.7%, mean halo length of 26.0 mm and mean number of days for boll bursting 126 as against 448 kg ha, 34.4%, 22-9 mm and 123 days of MUC. 7

Multilocation trials have been arranged during summer 1977 for SVPR. 75, SVPR. 124 and SVPR. 134 against MCU. 7 under the rice fallow conditions in Trichy and Thanjavur districts.

R. 19. Ag. Bot. 201 Rice improvement in Pondicherry region for short and medium duration varieties

S. R. Sree Rangasamy and P. Narayanasamy

Thirty six rice genotypes of early and short duration from different cross combinations were assessed for their performance in comparison to the popular varieties ADT 31. Vaigai, Tiruveni, and Amaravathi. Culture TNAU. 6484 (Culture 340 x Kannagi) of 86 days maturity gave highest yield of 4662 kg/ha on an average among early maturing varieties of 90 days and less, which is 11% higher yield over Amaravathi (Co. 39) and 17% over CRM. 13-1342 on early mutant from CRRI, Cuttack. Culture TNAU. 2270 and 633 of 95-100 days, IET. 3279 and ADT. 31 of 100-105 days and TNAU. 658 and Vaigai of 105-100 days duration gave highest yields in the respective duration groups. Among the varieties now under spread in *navarai* and *sornavari*, Vaigai, ADT.31 and Tiruveni perfomed better in the coastal belt of Pondicherry.

In addition, a total of 211 hybrid derivatives of the crosses of medium duration involving Ponni, Co. 25, Co. 4 and Bhavani on one hand and IR. 8, IR. 22, 26, IET. 2608 and Kanchi on the other were studied under F 3, F 4 and F 5 generations. Besides selecting 67 single plants from the cross IR.8 x IR.26 and Bhavani x Kanchi for further study, 35 progenies from four sets of derivatives IR. 8 x Ponni, IR. 8 x IR. 20, Bhavani x Kanchi and IR. 22 x Co. 25 were fixed for test under yield trial.

In the trial conducted with five hybrid derivatives including Co.40 (Rajarajan) compared against Ponni, BCP. 1 and Co. 38 (Bhagavathi), Co.40 (Rajarajan) ranked first by recording 7000 kg of grain per hectare while other varieties recorded yield ranging from 3000 to 4500 kg/ha.

R. 19. Ag. Bot. 202 **Evaluation of rice varieties with respect to the degree of tolerance to delayed planting from nursery bed**
P. Narayanasamy and S. R. Sree Rangasamy

Effect of planting aged seedlings in rice was studied with reference to the field performance. Medium duration varieties upto 50 days old seedlings were tried.

The study broughtout that the planting of aged seedlings beyond 20 days not only decreased the yield but also increased the duration of the crop. The increase in duration was found to be a week for every 10 days delayed planting. The decrease in yield varied according to the variety from 5% to 8% in early varieties 2 to 34% in short duration varieties and 3 to 8% in medium duration varieties in 30 days old seedlings as compared 20 days old seedlings. In 40 and 50 days old seedlings the reduction in yield was still higher upto 56% in early varieties 49% in short duration and 36% in medium duration varieties. Varieties ADT 31 and IR 20 exhibited a high degree of tolerance towards age of seedlings upto 30 days. The reduction in yield was found to be 8% for every 10 days delayed plantings beyond the age of 30 days.

PLANT PHYSIOLOGY

R. 1. Pl. Physiol. 101 **Studies on production physiology in groundnut**
N. Natarajarathnam and M. Chellappa

Among three varieties viz. TMV. 2 (bunch), Ah. 39 (bunch) and GNLM (semi spreading) investigated, it was observed that leaf nitrogen synthesis showed two peaks in TMV. 2 and Ah. 39 while there was only one peak in GNLM.

The carbohydrate content increased upto 70th day and decreased thereafter in TMV. 2 and Ah. 39 while in GNLM an increasing trend was noticed till the 100th day.

It was found that with increase in the nitrogen content of leaves during the later stages of growth in TMV. 2 and Ah. 39, there was greater translocation of carbohydrates to the pods resulting in the low carbohydrate content in the leaves.

When POL. 1 (bunch), TMV. 10 (semi-spreading) and TMV. 1 (spreading) were compared for the above two components in the next season a similar trend of two peaks of N synthesis was noticed in POL. 1 alone thereby confirming the earlier observation observed in TMV. 2 and Ah. 39.

R. 1. Pl. Physiol. 201 **Evaluation and screening of high yielding cold tolerant dwarf rice varieties for late *samba* season**
J. Sakharam Rao and R. Radhakrishnan

Out of a total of 894 cultures and progenies screened for cold tolerance, crosses between H. 4 x ASD. 8, Jaya x Co. 18, Monila x Kalimpang II and IR. 8 x H. 4 were generally tolerant to low temperatures. The average nitrogen content was higher in susceptible cultures.

R. 1. Pl. Physiol. 203 Screening of rice varieties used in breeding programme for salt tolerance
J. Sakharam Rao and R. Radhakrishnan

Screening of 872 rice cultures and varieties for salt tolerance indicated that Gettu, *kattai samba*, 7583-2, 13227-2, 13227-15 and 17036 were highly tolerant to salinity. A positive correlation was established between salt tolerance and carbohydrate content while a negative correlation was evident between chloride content and degree of tolerance to salinity.

R. 1. Pl. Physiol. 204 Physiological studies on the available genotypes employed for inter varietal crosses
S. Gopalakrishnan and P. S. Srinivasan

A study of 43 collections pertaining to intervarietal crossing programme revealed that physiological characteristics were a function of habit. Moisture retention in leaves is markedly high in 'spreading' types compared to 'bunch' and 'semi spreading'. Soluble nitrogen and carbohydrate status increase in the order of habit viz. bunch, semi-spreading and spreading. High yielders have been spotted among the groups- H. 2-14, EX. 1-1 and J. 11 (bunch); C. 501, TMV. 8 and T. 64 (semi-spreading) and TMV. 4 and JH. 60 (spreading). Pod production characteristic is appreciable in Ah 7917 (bunch), Ah. 7456 (semi-spreading) and 4-16 (spreading).

R. 1. Pl. Physiol. 205 Effect of planofix on groundnut
S. Gopalakrishnan and P.S. Srinivasan

Planofix 10 and 40 ppm were sprayed on two occasions on 40 and 60 days after sowing promoted groundnut yield in the range of 24.8 to 21.7 per cent. Shelling percentage increased from 68.65 (control) to 77.95 per cent (40 ppm.) Lesser peg/pod ratio (0.25 Vs. 0.48) and better mature/immature ratio (508 Vs. 799) and 100 kernel weight increase (30.30 Vs. 32.80) were obtained due to 40 ppm planofix spray

R. 1. Pl. Physiol. 206 Studies on the physiological efficiency in relation to plant canopy in redgram

K. Ramachandran and Kamala Thirumalaisamy

Three redgram varieties viz. Co.2, S.18 and SA.1 were included in the flower drop studies using growth regulators. Varieties Co.2 and S.18 responded well to 100 ppm ethrel spray which increased the grain yield by 10.7% and 37% respectively. Water spray was most effective in respect of variety SA.1.

R. 1. Pl. Physiol. 201 Studies on the physiological efficiency in relation to plant canopy in greengram

K. Ramachandran and Kamala Thirumalaisamy

The germplasm comprising 264 cultures is being screened in the field with the object of fixing up suitable plant type.

Under flower drop studies, three varieties of greengram viz. Co.2, Co.3 and M.2 indicated that ethrel at 150 ppm spray increased the yield over control under rainfed conditions. The percentage of pod set was 69.7% and 54.5% respectively in the above strains.

While screening of cultures for tolerance to drought 23 were found to be resistant, 46 moderately resistant and 176 susceptible.

R. 1. Pl. Physiol. 210 Studies on the causes for reddening of leaves in cotton and control measures

M. Thangaraj

In *barbadense* varieties of cotton, reddening of leaves was commonly observed at several stages of the crop. As expected chlorophyll and nitrogen content in reddened leaves was rather low with high values of carbohydrate and anthocyanin pigments. The phenomenon could be corrected to a reasonable degree by foliar spray of 10% solution of magnesium sulphate along 1% urea.

R. 1. Pl. Physiol. 212 Studies on bud and boll shedding in cotton

M. Thangaraj

Several growth regulators and nutrient sprays (14) were employed on MCU. 5 and CBS. 156 varieties of cotton. The results of the trial indicated that ccc at 40 ppm increased the yield in in CBS. 156 by 277 kg/ha while planofix at 5 ppm was most effective for MCU.5, giving an additional yield of 333 kg/ha. In respect of both the varieties, the retention of buds, flowers and bolls were more along with decrease in shedding.

R. 1. Pl. Pahysiol. 213 Effect of highway pollution on crops
J. Sakharam Rao and Kamala Thirumalaiswamy

The effect of automobile exhaust was studied on tomato and bhendi to a width of 50 meters along the highways. Analysis of plants and fruits for copper, zinc, manganese ard iron indicated very little influence of pollution on the above contents.

R. 6. Pl. Physiol. 201 Studies on secondary and micronutrients on acid lime and mandarin
S. Subramaniam and S. Thamburaj

In mandarin, four sprays with 0 5 per cent zinc sulphate in the month of April, May, June and September reduced zinc deficient leaves from 82.8 per cent to 11.1 per cent in eight months after spray. The reductions were from 73.9 to 16.3, from 74 to 26.3 and from 72.8 to 18.4 per cent in iron, manganese and magnesium deficiency symptoms respectively when sprayed four times with 0.5 per cent iron sulphate, manganese sulphate and magnesium sulphate. The combination spray at 0.125 per cent of the nutrients four times reduced chlorotic leaves from 81.6 to 11.7 per cent.

AGRONOMY

R. 1. Agron. 219 Multiple cropping experiment in gardenland with intercrops
SP. Palaniappan, D. R. Thirunavukkarasu and E. Subbiah

At Coimbatore, cotton-sorghum-ragi rotation was tried with cowpea, lab-lab and blackgram as intercrops in sorghum, and blackgram, onion and greengram as intercrops in cotton, for increasing the intensity of cropping. The yield of sorghum and cotton was not affected by intercrops. The mean yield of cotton with country onion as intercrop was 13.42 q/ha followed by 12.78 q/ha with blackgram as intercrop. This is in conformation with the the previous year's findings that onion was the most remunerative intercrop in cotton.

R. 1. Agron. 221 Varieties, nitrogen, and time of sowing in irrigated cumbu
S. Purushothaman and N. T. Jaganathan

A study of four cumbu entries (New HB. 3, UCV. 1, UCH. 1 and UCH. 4) under different levels of nitrogen (25, 50 and 75 kg/ha) in different split doses (basal alone, basal and at tillering, flowering and panicle initiation) was conducted at Coimbatore. The results indicated that the hybrid UCH. 4 (3325 kg/ha) and the variety UCV. 1 (2650 kg/ha) recorded 49 and 19 per cent higher yield than the ruling variety HB. 3 (2220 kg/ha) under irrigated conditions. Application of 50 kg N/ha in two splits was found to be better than single

dose. March and July sowings were found to be favourable for recording higher grain yields with 2745 kg/ha and 2661 kg/ha respectively, as compared to other months of sowing.

R. 1. Agron. 240 Effect of growth regulators-Succinic acid on MCU. 5 cotton
M. R. Iruthayaraj

Cotton seed soaked in 50 per cent concentration of succinic acid solution gave a high yield of 1348 kg of seed cotton/ha which was 22 per cent more than the dry seed. The application of 1000 g of succinic acid/ha with fertilisers at sowing gave a yield of 1236 kg of seed cotton/ha, which was more by 41 kg/ha, than the application of fertilisers alone.

R. 1. Agron. 261 Studies on plant density in dry sorghum
A. Chamy

The hybrid Uch.H. 1 was significantly superior to CS.3541 and on par with Co. 21 at Coimbatore. The grain yields recorded by Uch.H. 1, Co. 21 and CS. 3541 were 3114, 2903 and 2667 kg/ha respectively. All the varieties recorded the highest grain yield at 45 x 12 cm spacing. Uch.H. 1 registered the highest straw yield of 15,307 kg/ha.

R. 1. Agron. 262 Intercropping sorghum with pulse under rainfed conditions
A. Chamy

At Coimbatore, the highest sorghum grain yield of 3308 kg/ha and an income of Rs. 6460/ha were recorded with sorghum and lab-lab combinations. Of the systems of planting paired row planting (30 x 60 cm) of sorghum with two rows of pulse registered the highest monetary return of Rs. 6092 as against Rs. 5761/ha for solid stand of sorghum.

R. 1. Agron. 266 Determination of manurial requirements for dry land *Samai (Panicum miliare)*
S. Michael Raj and K. K. Chandragiri

Under rainfed condition there was no response to different levels of nitrogen in *samai* Co. 2 at Coimbatore. The seed rate of 10 kg/ha recorded significantly higher grain yield of 8.43 q/ha than other seed rates.

R. 1. Agron. 273 Chemical weed control in groundnut
R. Kulandaivelu and R. Shantha

At Coimbatore, under irrigated conditions, alachlor 5 lit a.i/ha applied as pre-emergence spray gave the maximum yield of 2743 kg of pods/ha. The

cost of application of alachlor works out to Rs. 125/ha. Compared to the cost of herbicides and manual weeding, the yield obtained under alachlor was found to be economical.

R. 1. Agron. 289 Soil fertility management under intensive cropping system in gardenland
SP. Palaniappan and K. Venugopal

Among the three crops taken in one sequence at Coimbatore, maize and sunflower yields were low (1500 and 990 kg/ha respectively) and sorghum yield was better than average (4600 kg/ha). Cotton yield steadily declined in 'cotton after cotton' plots while its yield was good in plots which had *ragi* or sunflower as the previous crop.

R. 1. Agron. 308 Fertiliser cum population density trial on sunflower
J. Krishnarajan and D. Sivasankaran

The spacing of 30 x 30 cm on EC. 101495 under irrigation at Coimbatore recorded significantly superior seed yield of 1149 kg ha over other spacings. 40:60 40 kg of NPK ha gave the highest seed yield of 1188 kg/ha.

R. 1. Agron. 316 Fertilizer trial on *Olitorius* jute
P. K. Rangiah and P. Rajendran

The JRO. 878 variety under irrigation at Coimbatore gave the highest fibre yield of 24.04 q/ha for the application of 60:30:30 kg NPK/ha. The JRO. 878 was found to be superior to JRO. 632.

R. 1. Agron. 332 Fertilizer cum spacing trial on redgram
S. Ramiah and N. Subramaniam

Under rainfed conditions at Coimbatore, a pure crop of Co. 2 redgram responded well to the application of 25 kg in each of N and P_2O_5/ha. The increase in grain yield was about 76 per cent over no fertiliser. The optimum spacing was found to be 45 x 20 cm. (1.11 lakh plants ha)

R. 1. Agron. 335 Maximum yield prduction potential trial on cotton
M.R. Iruthayaraj

In MCU. 5, the treatment combination of improved cultural practices as per recommended package of practices with fertilisers, pesticides and cultural practices gave the maximum seed cotton yield of 1497 kg/ha, whereas in CBS. 156 the same treatment gave a yield of 1086 kg/ha at Coimbatore. It was observed that the cycocel spray on CBS. 156 cotton reduced the yield.

P. 1. Agron. 335 Efficiency of NAA on boll retention of cotton variety MCU. 5

M.R. Iruthayaraj

Application of 30 ppm NAA at flower initiation followed by 20 ppm spray 15 days after the first spray with planofix was found to be efficient in retaining bolls and thereby increasing the yield of seed cotton (1876 kg ha) as compared to control (1376 kg ha) at Coimbatore. Application of NAA in the form of fruitofix was inferior to planofix at all the concentrations

P. 1. Agron. 338 Comparative response of CBS 156 and other hybrid cotton to cultural and manurial practices.

M R Iruthayaraj

The average yield of seed cotton recorded by CBS 156, H2 and H3 were 1643, 1711 and 1742 kg/ha respectively at Coimbatore. The 90 kg N/ha recorded the highest yield of seed cotton than 60 and 120 kg N ha. There was no significant difference in yield between 90 and 120 cm of row spacing.

P. 1. Agron. 343 Study on the control of *Solanum elaeagnifolium* in crop fields

A.V. Rajan and S. Balu

In maize field the net savings due to 2, 4-D application was Rs 380 and Rs. 905/ha at Peedampalli and Somanur respectively. In cumbu and ragi also maximum yield was obtained in 2, 4-D plots and the net savings due to its application were Rs 665/- for cumbu and Rs. 211 and Rs. 126 for ragi at Peedampalli and Somanur centres, respectively.

P. 1. Agron. 344 Package of practices for turmeric

T.S. Theetharappan and V M. Srinivasan

At Coimbatore sowing turmeric from 2nd week of May to 3rd week of June was ideal with a yield ranging from 23.2 to 24.3 t/ha. Growing *bhendi* as intercrops with turmeric recorded a maximum yield of 17.5 tonnes of raw rhizomes and 15 tonnes of bhendi per hectare, fetching an additional income of Rs. 6000/ per hectare. This was followed by onion grown as intercrop, with a yield of 20 tonnes of rhizomes/ha and 2 tonnes of onion/ha, realising an additional income of Rs. 5800/ha. Intercrops like ragi, maize and sunnhemp reduced the yield of turmeric. In the nitrogen management experiment 120 kg/ha applied in 5 splits (as basal, 30th, 60th, 90th and 120th day) recorded the highest yield of 26.7 t/ha.

P. 1. Agron. 359 Management of non-cash inputs to increase the efficiency of 'N' on moderate level

A. Subramaniam and A. Rajagopal

It was found at Coimbatore on medium duration varieties that 35 day old seedlings, planting seedling at 6 to 7 cm deep, planting at a spacing of 20x10 cm, timely weed control and applying 50 kg N/ha recorded the highest

grain yield of 4086 kg/ha indicating that even though the seedlings were older, the effect of age can be mitigated by the above agronomic practices.

R. 1. Agron. 362 Mixed cropping experiment on sesamum (rainfed)
P. Sennaiyan and L. Arunachlam

Mixed cropping with pulses at Coimbatare gave significanty higher monetary return than pure crop. Maximum profit of Rs. 1622/ha was obtained for sesamum + redgram mixture at 1:1 row ratio, followed by blackgram (Rs. 1119/ha) and greengram (Rs 849/ha). Mixed cropping increased the post harvest soil fertility status and sesamum + greengram at 1:1 row ratio recorded 20 kg N/ha and 14.50 kg P_2O_5 /ha more than pure crop.

R. 1. Agron. 363 Manurial cum rotation experiment in cotton
M.R. Iruthyaraj

The rotation followed at Coimbatore is ragi-cotton-sorghum. It was found that by adopting this rotation a saving of 52 kg N/ha or Rs.234/ha can be obtained. This is possible by applying the full dose of 90 kg N/ha to ragi, applying 50 per cent of the recommended dose of N to cotton and applying 75 per cent of the recommended N to sorghum.

R. 2. Agron. 219 Mixed cropping in irrigated cotton CBS. 156
S. Kolandaiswamy and S.N.M. Ramachandra Boopathi

Cowpea was found to be best suited as a mixed crop for irrigated cotton CBS. 156, compared to greengram and blackgram for getting higher returns. Cotton with cowpea gave a maximum profit of Rs. 2699/ha, followed by cotton alone, which accounted for a net profit of Rs.2005/ha.

R. 3. Agron. 215 Production potential experiment
J.G. Robinson

Among the four crop sequences tried, viz., rice-rice-groundnut, rice-rice-rice, rice-groundnut-*bajra*, and rice-rice-*jowar*, the crop sequence rice-rice-rice recorded the highest grain production of 11,504 kg/ha with a per cropped day and per calendar day prodution of 36.6 kg/ha and 31.5 kg/ha respectively, followed by rice-rice groundnut, which recorced 10,647 kg/ha of grain with a per cropped day and per calendar day production of 34.6 kg/ha and 29.1 kg/ha respectively.

R. 4. Agron. 203 Multiple cropping in the Parambikulam Aliyar Project
A. Rangaswamy

Under gardenland conditions of Parambikulam Aliyar Project area, the crop sequence redgram (Co.2)-maize (Ganga.5)-groundnut

(Pol 1) gave a net profit of Rs.4,602/-per ha with a net return of Rs. 13.60 day ha.

R. 4. Agron. 204 Trial on the evaluation of suitable cropping pattern for the Parambikulam Aliyar Project area under rainfed and irrigated conditions
A. Rangaswamy

In gardenland when the canal water is available in the first season, irrigated cholam followed with horsegram in the second season under rainfed condition recorded a net profit of Rs. 2 676/ha. When canal water is available in the second season, MCU. 5 cotton in the second season under irrigated condition with groundnut in the first season under rainfed condition recorded a net profit of Rs. 5167/ha

Similarly in wetlands when water is available in the first season paddy Vaigai followed by blackgram in the second season under rainfed condition recorded highest net return of Rs. 3,856/ha. When canal water is available for wet cultivation in the second season Co. 32 in second season precceded by groundnut under rainfed condition in the first season recorded a net return of Rs. 7,247/ha.

R. 9. Agron. 204 Package of practices-rice
V. Subbiah, S Ramakrishnan, N. Jaleel Ahmed and K. C. Chandy

In the studies made during the *samba* season of 1975-76 culture 13493 (Co. 40) was found to significantly outyield the ruling Co. 25 variety, the mean grain yield per hectare recorded by the cultures and the variety being 6231 kg and 2444 kg, respectively. The other factors of study viz., irrigation methods, fertilizer levels and *Azotobacter* treatment did not significantly influence the yields.

The study revealed that culture 13493 is quite suitable for replacing the existing Co. 25 rice variety in the Thanjavur delta.

R. 10. Agron. 201 Spacing cum manurial experiment on coconut
I. Henry Louis

In the sixteenth year of study substantial increase of growth characters due to fertiliser application was recorded. There was an increase of 133.9 and 198.6% respectively, in yield of nuts in palms receiving single and double dose of fertilizer over control. Spacing also produced distinct differences in the yield. Palms under 9.1 m x 9.1 m spacings recorded 14.1% increased yield over those under 6.1 m x 6.1 m.

R. 10. Agron. 202 Depth of Planting
K. P. Vijayan and C. Jayaraman

Planting of coconut seedlings in 90 cm x 90 cm x 90 cm pits at 60 cm

depth had induced better anchorage due to the production of higher number of roots, i.e. 6142 roots per palm as against 3055 roots per palm in the surface planted palms and 60 cm planting also induced early flowering by ten months. The palms planted at 60 cm depth continued to register the maximum yield of nuts and this year also they recorded 62 nuts per palm as against 56 nuts per palm in the surface planted control.

R. 10. Agron. 203 Experiment to determine realistic yardstick for coconut
S. D. Peter and C. Jayaraman

The experiment to determine the effect of irrigation, manuring and cultural practices on coconut seedlings tried singly and in various combinations revealed clearly that combination of cultural, irrigation and manurial treatments induced earliness and in the ninth year it registered a maximum mean yield of 25 nuts per palm, whereas the treatment with manuring alone recorded 19.9 nuts. Irrigation in combination with manuring recorded 22.8 nuts and cultural practices with manuring gave 10.3 nuts as compared to no yield in the control i.e. without irrigation, manuring and cultural practices.

R. 10. Agron. 203 Study of effect of summer irrigation on coconut palms
S. D. Peter and C. Jayaraman

One hundred and eighty palms of uniform age of 26 years old were taken up for studying the effect of summer irrigation on the yield of nuts during the year. Irrigations were given at 10 days interval for 90 palms and the rest were left unirrigated, while fertilizer inputs and cultural operations were uniform for all the palms. The study of the yield data revealed that the irrigated palms registered a mean yield of 50 nuts per palm per year as against 25 nuts per palm per year of unirrigated palms, the increase in yield being 100 per cent over the unirrigated palms.

R. 13. Agron. 203 Assessment of time of planting and harvesting for some commercial and promising varieties in sugarcane for getting highest recoveries
K. V. Daniel and T. Sugumaran

Six promising sugarcane varieties were planted in two seasons viz., March and July and harvested at 11th, 12th and 13th month. March planting and harvesting in March (12 months after planting) recorded superior CCS% of 13.91, irrespective of the identity of the six commercial varieties tested.

R. 13. Agron. 204 Response of commercial early and late maturing varieties of the region to time of nitrogen fertilizer application
K. V. Daniel and M. Suresh Kumar

The effect of time of nitrogen application was studied in four promising commercial varieties, viz., Co.419, Co.658, Co.853 and Co.6304. Application of entire dose of 250 kg N ha at 90th day recorded superior cane yield of 92.0 t/ha.

R. 13. Agron. 205 Effect of chemical ripeners

K. V. Daniel and M. Suresh Kumar

Three chemical ripeners, viz. cycocel (4 kg a.i./ha), polaris (4 kg a.i./ha) and sodium metasilicate (2000 ppm/ha) were sprayed at 9th month, i.e., one month prior to first harvest of sugarcane and the juice quality was tested at 10th, 11th, 12th and 13th month. Cycocel was found to be more effective in improving the percentage of sucrose in both Co 6304 and Co 853. The percentages of increase of sucrose over control were 10.1 and 8.3 at 10th and 11th month in Co 6304, and 1.41 and 12.1 at 10th and 11th month in Co 853 respectively.

R. 15. Agron. 208 Agronomic means to increase the yield in groundnut

N. Gopalaswamy and R. Elangovan

The two bunch cultures (Ah. 8253 and Ah. 8254) did not differ in their yield under irrigated conditions, while the difference was significant among the spacing and K levels. The spacing of 30 x 10 cm registered significantly higher yield (1864 kg/ha) than 30 x 15 (1639 kg/ha) and 20 x 10 cm (1546 kg/ha). The net profit accrued in this spacing (30 x 10 cm) was 11.0% over the widest spacing of (30 x 15 cm). Application of 60 kg K_2O/ha significantly increased the pod yield over 0 and 30 kg/ha and was on par with 90 kg/ha. The economic optimum dose was computed to be 57 kg/ha with a net profit of Rs. 2.38 per rupee spent on potash application.

R. 17. Agron. 206 Mulching experiment on sorghum

C. T. Natarajan and K. Devasundaram

A mulching experiment was laid out on sorghum Kovilpatti Tall with three mulches viz. stubble mulch, straw mulch and dust mulch using four weeding tools viz. Coimbatore weeder No. 1, Coimbatore weeder No. 2, Dutch hoe and local hand hoe. Straw mulch gave the highest grain yield of 1920 kg/ha and weeding with hand hoe gave the mimimum of 1457 kg/ha.

R. 17. Agron. 207 Fertilizer use in dryland agriculture in sorghum - Response to phosphorus

C. T. Natarajan and K. Devasundaram

Two levels of nitrogen viz. 20 kg N and 40 kg N per hectare and four levels of phosphorus viz. 0, 20, 40 and 60 kg P_2O_5 per hectare were tried along with a control on sorghum hybrid Kovilpatti Tall. Control plot gave only 1290 kg/ha whereas 20 kg N and 40 kg N gave 1619 kg and 1750 kg, respectively. Application of nitrogen increased the yield significantly but the difference between 20 kg N and 40 kg N was not significant. Application of phosphorus increased the yield significantly and 60 kg

P_2O_5 gave the highest yield of 2053 kg/ha, and 0 kg P_2O_5 gave the lowest grain yield of 1410 kg/ha.

R. 17. Agron. 208 Fertiliser use in dryland agriculture - Response of blackgram to phosphorus application
C. T. Natarajan and K. Devasundaram

Two levels of nitrogen, viz. 0 and 20 kg/ha and four levels of phosphorus viz. 0, 30, 60 and 90 kg P_2O_5/ha were tried on blackgram Alangudi. Application of phosphorus incresed the yield significantly. Ninety kg P_2O_5 gave the highest yield of 786 kg/ha followed by 60 kg of P_2O_5 with 730 kg/ha. Thirty kg P_2O_5 was on par with 0 kg with mean bean yields of 627 kg and 602 kg, respectively.

R. 17. Agron. 221 Verification trials on farmers' holding
K. Rajagopalan and C. Ganesan

During 1976-77 *rabi* season, five verification trials to compare the improved technology with local practices were laid on cumbu hybrid UCH. 4 in farmers' fields around Kovilpatti. High input (40 kg N + 20 kg P_2O_5/ha combined with plant protection measures) and high management (spacing at 45 x 15 cm and timely weeding) were compared with the farmers' level of input and management. High input and high management recorded the highest yield of 824 kg/ha of grain and 5729 kg/ha of straw. High input and high management was significantly better in grain yield than all the other treatments tried, while in straw yield, it was on par with high input and low management and was superior to the other two treatments.

R. 18. Agron. 205 Maximum yield potential trial on cotton
S. R. Chowdappan, N. Balasubramanian and
R. M. Kasiviswanathan

For CBS. 156 cotton the treatment of improved cultivation practices recorded the maximum yield of 2,305 kg/ha of seed cotton, while in the case of MCU. 8 cotton variety, the treatment of improved cultivation practices has recorded the maximum yield of 2,107 kg/ha of cotton. The yield increase also increased the net return per hectare.

R. 18. Agron. 206 To study the efficacy of *Azotobacter* in cotton
S. R. Chowdappan, N. Balasubramanian and
R. M. Kasiviswanathan

The yield of seed cotton was influenced independently both by nitrogen levels and *Azotobacter* treatments. The highest yield of 1,534 kg/ha seed cotton was recorded under 75% of recommended nitrogen. Treating cotton

seeds with *Azotobacter* and mixing the culture in the soil before sowing at 75% recommended dose of nitrogen was the most beneficial treatment, with additional income

R. 19. Agron. 201 Studies on the optimum cropping pattern for Pondicherry region
D. R. Thirunavukkarasu and K. C. Gouthaman

The cropping sequence of rice-rice-rice-green manure was found to be remunerative, as the net income in this sequence was higher, accounting for Rs. 2520/- per hectare. The next best sequence was growing rice in *sornavari* and *samba* with either groundnut or *ragi* in *Navarai*, as the net income in these sequences were Rs. 2358/- and Rs. 2305/- per hectare, respectively.

R. 19. Agron. 202 Evaluation of low level fertilization in rice in combination with organic manure and micronutrients
D. R. Thirunavukkarasu and K. C. Gouthaman

A study on fertilisatian indicated that under the soil conditions at Krishi Vigyan Kendra, Pondicherry, the low level of 50 kg N + 50 kg of P_2O_5 + 50 kg K_2O/ha over 12.5 FYM/ha recorded the highest grain yield of 5720 kg/ha. The application of Zn SO_4 has not influenced the yield. The findings of the trial confirm the manuring recommendation of 120:60:60 kg NPK/ha for IR. 20 crop under Pondicherry conditions.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

R. 1. SS & AC. 202 Evaluation of rooting pattern of some important field crops using radioisotopes
T. L. Subramaniam and S. Ramanathan

An experiment conducted to study the distribution pattern of roots by using tracer technique with four varieties of ragi viz. Co. 7, Co. 10, EC. 4847 and EC. 4849 has showed that root distribution was concentrated more in the lateral than vertical distance. Shallow spreading was observed for the varieties Co. 7, Co. 10 and EC. 4849, while EC. 4847 showed a tendency for deep spreading nature.

R. 1. SS & AC. 203 Studies on the availability of zinc under different field conditions
G. Ramanathan and R. Nagarajan

A field trial conducted with six levels of Zn as Zn SO_4 (0, 10, 20, 30, 40 and 50 ppm of Zn) on MCU. 5 cotton indicated that application of Zn at 30 ppm registered the highest yield of cotton kapas, and the yield increase was 80 per cent over the control (NPK treatment alone).

A study to find out the uptake of Zn by Jaya rice variety revealed that the uptake of Zn was higher under conditions of non-submergence than under submergence and an increased uptake of Zn was observed with increased levels of Zn as $ZnSO_4$ (0, 12.5, 25 and 50 kg of $ZnSO_4$).

R. 1. SS & AC. 211 Extraction and production of leaf protein from different species
C. R. Lakshminarasimhan and Honora J. Francis

In a study to find out the amount of HCN of leaf protein extract of the leaves of cassava, it was found to be as low as 30 ppm. At this level there is no toxic hazard due to HCN.

A field trial with maize Ganga 5 and with three levels of nitrogen indicated that among the N levels 80 kg/ha and among the days of cuttings, 40th day cutting recorded the maximum forms of water extractable protein (WEP) and trichloroacetic acid (TCA) extractable protein.

R. 1. SS & AC. 214 Influence of high fertilization on the quality of crop produce
G. V. Kothandaraman and R. Krishnaswamy

A study of the crude protein content of IR. 20 rice revealed that the crude protein content of rice grain was increased from 7.77 to 9.57 per cent by the application of N at 180 kg/ha. The crude protein in rice straw was also increased from 3.81 to 4.59 per cent by the application of N at 180 kg/ha.

R. 1. SS & AC. 218 Studies on the losses of different forms of N from the soils
M. Guruswamy

A study of the percolation loss of N with different froms of N carriers and three levels of N (0, 120 and 240 kg/ha) in sandy loam indicated that the loss of N was in the range of 0.7 to 10.3 per cent of added N. The principal form of N in the leachate was No_3-N which accounted for 0.51 to 8.31 per cent of added N. Among the different carriers, ammonium nitrate and urea were subjected to heavy loss, but there was no significant differences among the different levels of N. The efficiency of N fertilizers increased in the following order: ammonium Sulphate > ammonium phosphate > urea > ammonium nitrate.

R. 1. SS & AC. 221 All India Coordinated Scheme on soil micro nutrients
G. Ramanathan, R. Nagarajan and R. Devarajan

Surface soil samples, totalling 261 from Tiruchirapalli District and 216 from Madurai District were analysed for micronutrients Fe, Zn, Mn

and Cu. The deficiences of Zn and Cu were widely prevalent in the two districts. Soil application of $ZnSO_4$ at 25 kg/ha to Zn deficient soil is recommended.

R. 1. SS & AC. 222 Coordinated scheme for the improvement of soil physical conditions to increase agricultural production of problematic areas
V. Ravikumar, P. Muthuvel, T. M. Thiagarajan and K. Shanmugam

Studies on the recycling of organic and mineral wastes in red sandy loam soils of Coimbatore indicated that application of poultry manure at 10 t/ha had a favourable influence on the yield of CSH. 5 sorghum. Farmyard manure, turkey and pig manure improved the hydraulic conductivity, aggregate stability and stability index of soil.

R. 1. SS & AC. 223 Effect of fertilizer use and pest management on changing environment under intensive cropping
K. K. Mathan

The results of a field experiment with cowpea Co. 1 revealed that the highest yield of 4576 kg/ha was obtained in plots which received 100 per cent of the optimum NPK (hand weeded) plots. The lowest yield was in the control plots (2839 kg/ha).

A similar trend was also observed with Ganga 5 maize and the highest grain yield of 3067 kg/ha was obtained by the application of 100 per cent NPK and FYM.

Periodical soil analysis revealed that continuous rotational cropping with ragi, cowpea and maize increased the available N, P, K and organic carbon in the soils.

Analysis of cowpea grain and straw samples revealed that the N content in the grain increased as the dose of N application was increased.

R. 1. SS & AC. 224 All India Coordinated Project for Research on forage crops
P. Muthuswamy and M. Govindaswamy

The study of the improvement of the quality of cereal fodders by growing them along with legumes indicated that cowpea plus maize gave the maximum crude protein yield as compared to the pure crop of cowpea or maize. The crude protein, P and Ca contents were also higher in the mixture than in the pure crop of maize.

Hybrid napier grass BN. 2 and NB. 21 had maximum crude proteir content in the first cut and the lowest in the eighth cut. The variety BN. 2 gave nearly 60 per cent more crude protein yield than NB. 21 in eight cuts taken.

R. 1. SS & AC. 225 **Chemical studies in All India Coordinated Agronomic Research Project**
G. Selvakumari, G. Viswanathan, N. Durairaj Muthiah and V. Sundaramoorthy

Uptake of nutrients by rice under cumulative, direct and residual phases of manuring with reference to P, K and FYM in Model Agronomic Experiment No. 2 was studied. It was observed that the application of K increased the uptake of K in all the three phases of manuring and the effect was more pronounced in the cumulative phase. Effect of applied P on the P_2O_5 uptake was seen in the cumulative and residual phase at 30 kg P_2O_5/ha level.

R. 1. SS & AC. 228 All India Coordinated scheme for investigation of soil test with crop response
C. S. Balasundaram, M. Shanmugam, R. Chandramani A. Natarajan and M. Sundarajan

A follow-up trial under soil test-crop response scheme was conducted in sandy loam soils of Bhavanisagar with Vaigai rice. The soil test recommendation based on Mitscherlich - Bray equation (141 N, 25 P_2O_5, 25 K_2O kg/ha) registered a yield increase of 66.3 per cen over the control and 9.8 per cent over the State recommendation (185 N, 25 P_2O_5 and 25 K_2O kg/ha), thus resulting in the saving of 44 kg N/ha, the cost of which works out to Rs. 176/-.

ʔ. 1. SS & AC. 232 Effect of intensive cultivation of high yielding crop varieties on soil properties - physical, chemical and biological
K. K. Krishnamoorthy and S. Subbiah

During the period under report, tenth crop of IR 20 was harvested ıd yields of grain and straw were recorded. Analysis of yield data ıowed that application of N at 360 kg/ha enhanced the yield of grain ıd straw. Application of K increased the available K content of the soil. ɔplication of N at 180 kg/ha increased the utilisation of available K of ə soil by the crop. Nitrogen applied plots exhibited marked increase the microbial population.

R. 1. SS & AC. 243 Studies on dynamics of soil potassium
K. K. Krishnamoorthy and K. M. Ramanathan

In a study conducted with 25 representative soils of Tamil Nadu with IR. 26 as test crop, the soils collected from Kancheepuram, Tindivanam Cuddalore, Tiruvannamalai, Dharmapuri, Kaveripattinam, Attur, Tiruchengode, Musiri, Tiruchy, Aduthurai, Melur, Tirumangalam, Paramakudi, Mudukalathur, Ambasmudram, Agastheeswaram, Kalkulam and Nanjanad responded to the application of K at 100 kg K/ha. The soil samples from Sriperumpudur, Gudiyatham, Coimbatore, Vadavalli, Gantharvakottai and Kovilpatti did not respond to the application of K.

In a field experiment conducted at the wet lands of Coimbatore IR. 26 rice did not respond to the application of K. Split application of K was also found to be not beneficial.

R. 1. SS & AC. 246 Studies on the residual toxicity of pesticides on common vegetables like bhendi, brinjal etc
U. S. Sree Ramulu and K. Rajukannu

Field experiments in bhendi (*Pusa Savani*) with insecticidal treatments of carbofuran seed soaking, seed coating and soil granular application were conducted. The study revealed that leaves recorded the highest residues than stem and petioles. The initial higher resudies in plants dissipated slowly and became innocuous after 70 days. 3 OH carbofuran was identified as the major metabolite found in fruit samples.

R. 1. SS & AC. 247 Studies on the mineralisation of slow acting fertilisers and the effect of nitrification inhibitors on their transformation in the soil
T. S. Manickam and D. Augustine Selvaseelan

A field experiment conducted with IR. 20 rice as the test crop showed that neem seed crush mixed urea with 100 per cent soil test value gave significantly higher yield than untreated urea alone. Neem seed crush mixed urea has been found to be on par with the N-serve treated urea, thus indicating the possibility of using neem seed and its products in reducing rate of mineralisation and thus increasing the fertilizer efficiency.

R. 1. SS & AC. 252 Studies on the balance sheet of micronutrients under rotation of different crops
U. S. Sree Ramulu and P. Savithiri

Maize grain and straw samples from the field experiment were analysed for Zn, Cu, Fe and Mn content. The statistical analysis of the data revealed that Zn application has not increased the Zn content of either grain or straw, whereas the application of $CuSO_4$ at 10 kg/ha increased the Cu content of

maize grain significantly (3.9ppm) over the control (2.9ppm). Total uptake of Zn, Cu and Fe by the maize crop was calculated. Highest uptake of Zn (1379 g/ha) was recorded by the application of 12.5 kg $ZnSO_4$/ha. Application of $CuSO_4$ and 12.5 kg of $ZnSO_4$/ha increased Cu uptake by maize crop (539.3 g/ha), while application of 25 kg of $FeSO_4$/ha increase Fe uptake of maize crop (8384.6 g ha). Highest grain yield (6461 kg/ha) of maize was obtained by the application of 25 kg of $CuSO_4$/ha.

R. 1. SS & AC 256 Studies on the factors influencing nodulation, nitrogen fixation and quality of produce in different genotypes of blackgram (*Phaseolus mungo*)
G. Oblisami and P. P. Ramaswami

Four hundred and thirty germplasm collections of blackgram were raised in the field. It was observed that as the duration of the crop increased the number and weight of the nodules formed increased. Weight of top and root was higher in long duration than in short duration varieties. The nitrogen fixation was more in the nodule of short duration crop as compared to the long duration one. Inoculation with *rhizobium* with seed increased number of nodules, nodular tissue weight, nitrogen fixation through nodule, weight of shoot and root over non-inoculation. Short duration varieties responded better to inoculation for nodulation and yield of grain than medium and long duration varieties. Inoculation increased the yield of grain by 27.7 per cent in short duration varieties.

R. 1. SS & AC. 259 Studies on the zinc nutrition using tracer technique
K. K. Krishnamoorthy and V. S. Krishnamurthy

An experiment to study the zinc responsiveness of popular rice varieties to graded levels (0, 5, 10, and 15 ppm) of zinc application using zinc deficient soil was conducted. Varieties TNAU culture 658, R. P. 4-14, Bhavani, IR. 8, Co. 28 and Co. 40 showed significant response to zinc application. The yield increase ranged from 20 per cent in TNAU culture 658 and 60 per cent in IR.8. Application of 70 kg $ZnSO_4$/ha was observed to be optimum.

R. 2. SS. & AC. 202 Study of storage life and keeping quality of pesticides in common use
Rani Perumal and C. Paulraj

In a trial with five pesticides and fungicides (Lebaycid 99.83 EC, Rogor 33.21 EC, Fytolan 49.83% WP, Maneb 74.18% WP and Zineb 74.77% WP) initiated to study the environmental conditions (light, temperature and humidity) and container effect on storage quality, the analysis of 60 samples for their a. i content after 3 months revealed that the deterioration of a i. was not noticeable even in the container supplied by the company. Among the environmental factors, humidity deteriorated the a.i. to the extent of 0.054% followed by light (0.036%) and temperature (0.013%).

R. 2. SS & AC. 203 **Influence of high fertilization on the quality of crop produce**
P. Kandaswamy and T. Balakrishnan

The grain samples from Bhavani variety of paddy fertilised with different doses of NPK fertilizers, were analysed for their crude protein content. The normal recommended NPK dose of 150-70-70 kg/ha gave rise to grains with maximum crude protein content of 11.8%. Higher and lower fertilizer levels decreased the crude protein content.

R. 2. SS & AC. 101 **Study on the behaviour of added phosphates in the soils of variable physico-chemical properties**
C. R. Venkataramanan, A. Chandrasekaran and S. Mani

The general trend obtained from the yield of ragi grain from the differently treated pots was that the response of black soil to the different types of phosphates, especially at the higher dose, was better than that in the red soils.

The chemical analysis of plant samples revealed that the P uptake was better in black soil than in red soil. The grains from pots treated with 125 kg P_2O_5/ha in any from were found to be richer in phosphorus than those from pots receiving half that dose.

AGRICULTURAL ENTOMOLOGY

R. 1. Ag. Ent. 201 Studies on the white tip nematode of rice
T. S. Muthukrishnan and G. Rajendran

Pot culture studies on the control of white tip nematode of rice confirmed the efficacy of fenthion 0.1% spray on 30th and 45th days after planting as well as hot water treatment of seeds followed by parathion 0.025% spray twice after planting. Aldicarb sulfone 0.1% as foliar spray was also superior and on par with carbaryl 0.1%, chlorfenvinphos 0.1%, methomyl 0.05% and methyl demeton 0.05% spray. Among fiftyfive rice cultures and varieties screened under natural condition in the field for the incidence of white tip nematode at the flowering stage, seven cultures and 14 varieties viz. T. 396, T. 301, T. 482, T. 292, T. 25, T. 228, T. 246, IR. 20, Sunja, Sorna, TKM. 7, Co. 13, Ratna, Aswathi, Padma, IR. 22, IR. 28, Triveni, Kannagi, Co. 35, IT. 30, and Rohini recorded less than 5% earhead infestation.

In the field trial on seed treatment followed by foliar application, it was noticed that the hot water seed treatments followed by parathion 0.025% spray on 30th day has recorded increased yield of 27.27% over control.

R. 1. Ag. Ent. 202 Studies on the rice-root nematode
T. S. Muthukrishnan and G. Rajendran

Screening of different chemicals for the control of rice root nematode under pot culture condition has shown effective reduction in the nematode population in the roots of the plants treated with Nemagon (15 nematodes/10/g of roots) as against in untreated plants (776/10 g). Significant increase in yield was observed in diazinon and Nemacur at 1 kg a. i./ha recording high yield of 16.3 and 14.0 g respectively in contrast to 9 g in control plants.

When sixty cultures and varieties were screened under natural condition in the field at harvest stage, Sabarmathi, Soorya, T.292 IR.28, T.245 recorded less than 10 nematodes/10 g of roots as against 227 10 g in Co.23. Another set of 57 varieties screened under pot culture condition showed that Sabarmathi, TKM.6, IR.28, Jaya, Co 35 and Jaganath harboured less than 10 nematodes in contrast to 285/10 g of roots in Pankaj. In the field trial application of phenamiphos at 1 kg a.i./ha increased the yield by 33.9% over the untreated plots.

R. 1. Ag. Ent. 207 Control of groundnut red hairy caterpillar
A. Sadakathulla

The results of the trials conducted in the laboratory and field against groundnut red hairy caterpillar, *Amsacta albistriga* indicated that one spraying with either nuvacron 0.05% or dursban 0.05% or phendal 0.05% or volaton 0.05% or phosalone 0.05% was effective in controlling the pest.

R. 1. Ag. Ent. 208 Control of groundnut surulpoochi
S. Sadakathulla

From the field trials conducted at Coimbatore and Bhavanisagar, it was concluded that spraying with either nuvacron 0.05% or zolone 0.05% or Sumicidin 0.05% or Phendal 0.05% twice on 30th and 50th day after sowing, controlled the pest effectively and increased the yield.

R. 1. Ag. Ent. 217 Control of stem borer, leaf roller and leaf hoppers on rice
I. P. Janaki and M. Mohanasundram

Two rounds of application of Sevidol 8 G at 1kg a.i./ha at 20 DAT and 0 DAT was effective in controlling the stem borer and increasing the yield by 6.9% over control. The cost of treatment was Rs. 200/ha and the net profit s. 1234/ha. Among spray the formulations monocrotophos 40 EC at 0.5 kg i./ha on 15, 60 and 75 DAT was effective in controlling stem borer with an icrease in yield of 20.53% and the cost of treatment was Rs. 562/ha with a net ofit of Rs. 208/ha. Among the newer insecticides, Tamaron 50 EC at 0.5 kg/ha

applied thrice at 15, 35 and 70 DAT was found superior to other chemicals in controlling the brown plant hopper.

The result of *Kharif* '76 experiments showed that seedling root dip in Dursban 24 EC at 0.04% for 4 hours gave minimum infestation of thrips. The pre-release variety CR 94-MR 1550 was found to record 77% increased yield under protected conditions. The cost of treatment for 3 applications of furadan at 1 kg a.i./ha was Rs 1400/- with a net return of Rs. 1040/ha. Among the newer insecticides chlordimeform (Galecron 50 sp) at 0.5 kg a.i./ha applied at 24 and 55 DAT reduced the incidence of pests and recorded an yield of 4814 kg/ha as against 2225 kg/ha in the control.

R. 1. Ag. Ent. 218 Screening for resistance to stemborer, leaf hopper and leaf roller in paddy
M. Mohanasundaram

A total of 350 varieties of germplasm materials were raised in flats by direct seedling, with a minimum of 25 seeds per variety and infested with egg masses of *Tryporyza incertulas* at the rate of two egg masses per flat. The larvae that hatched from these egg masses were allowed to spread uniformly among the varieties. After 30 days the varieties were evaluated based on dead heart damage. The variety type 1854 (-52 Phutuk) was found highly resistant to stem borer.

R. 1. Ag. Ent. 221 Control of sorghum midge
M. S. Venugopal and M. Mani

Dusting of either malathion 4% or phosalone 4% or spraying leptophos (.03 kg a.i./ha) or chlorphyriphos (0.2 kg a.i./ha) once at 50 per cent flowering and the second a week after controlled the midge effectively. The damage ranged from 12.5 to 13.2 per cent in these treatments as against 66.4 per cent in the control.

R. 1. Ag. Ent. 223 Control of cotton bollworms and sucking insects
Sellammal Murugesan and S. Parameswaran

Two field experiments were conducted to test the efficacy of Anatox (Toxaphene), Tafidex (DDT) and Heliotox (Toxaphene + DDT) against aphids and jassids and one experiment for the control of bollworms on cotton under the scheme financed by M/s. Rallis India Limited. The results indicated that Heliotox was effective against jassids. Heliotox was effective in reducing the bollworm incidence also. The percentage of bollworm damage was 22.99 in Heliotox treated plots as compared to 86.36 in untreated control.

Laboratory studies with Anatox, Tafidex and Heliotox each at two concentrations viz., 0.025% and 0.05% on cotton aphid *Aphis gossypii* G.

revealed that all the three chemicals were equally toxic to aphids. Among th two concentrations 0.05% was more toxic to aphids than 0.025%.

R. 1. Ag. Ent. 232 Studies on the nematode parasites associated with crossandra
T. S. Muthukrishnan and Sivagami Vadivelu

In the potculture experiments for the control of root-lesion nematode *Pratylenchus delattrei* on crossandra, application of aldicarb, nemagon and phorate granules at 1 g/plant effectively reduced the nematode population and increased the shoot height, shoot weight, root length and weight. Highest number of flower yield was realised in phorate treated plants. Nursery treatment with phorate at 5 g/metre row gave healthy seedlings.

In the field expriment aldicarb 10 G, carbofuran 3 G, nemagon 5 G and phorate 10 G applied at 1 g/plant on 7th day and in the 4th month after planting recorded low nematode population. In flower yield, carbofuran gave the highest average of 1331 kg/ha as against 386 kg/ha in control plots.

R. 1. Ag. Ent. 233 Control of grasshopper and earhead caterpillar of sunflower
V. T. Sundaramurthy and N. Mukunthan

Application of any one of the insecticides viz., phosalone, quinalphos, thiometon, carbaryl, fenthion and endosulfan at 0.05% was found effective against capitulum borer to the extent of 29.0 to 54.8 per cent, jassids to the extent of 81.1 to 100 per cent, whiteflies to the extent of 75 to 100 per cent and weevils to the extent os 83.42 to 100% per cent.

R. 1. Ag. Ent. 234 Studies on pollinators of sunflower
V. T. Sundaramurthy and N. Mukunthan

Spraying fermented Neera at 100 per cent on capitula of sunflower has increased the seed set by 14.18 per cent over untreated check. The visited bees spent more time on the treated flowers. The bee activity was reduced to the extent of 3 to 10.9 per cent in the plots treated with quinalphos, phosalone, thiometon, fenthion and thiodan. The variety EC.68415 attracted more number of bees and bee activity was maximum on November sown crop from 3rd day to 8th day of flowering.

R. 1. Ag. Ent. 236 Scheme on surveillance of pests and diseases in Coimbatore District
P. V. Subba Rao and R. Ramaswamy

Periodical survey of pests and diseases in the University and private farms were carried out on paddy, cotton and sorghum in unprotected

condition. Paddy stem-borer incidence was more in Bhavanisagar during July-November. High incidence of shootfly was recorded on Uch V 1 sorghum in Coimbatore. Dead hearts due to stem borer was more in Uch-H.1 in Pollachi. On MCU 5 cotton, high incidence of bollworms occured in summer in Palladam while in the main season, at Bhavanisagar and Dharapuram.

High incidence of bacterial blight was recorded on IR 20 and Bhavani in Dharapuram and *Helminthosporium* grain infection on Bhavani in Coimbatore in the second season. On MCU 5 cotton high incidence of bacterial blight was observed at Sathyamangalam and Gobichettipalayam during the main season. On Uch. H 1 sorghum moderately high incidence of *Helminthosporium* leaf stripes at Pollachi and on Uch-V. 1 sorghum heavy incidence of head-moulds at Aliyarnagar and Coimbatore were recorded.

R. 1. Ag. Ent. 237 Studies on residues of pesticides in plant and soil
K. Saivaraj, K. Rajukkannu, D. Kandasamy,
P. Vasudevan and K. Chendrayan

Tomato, bhendi and brinjal crops were sprayed with methyl parathion (0.5 kg a.i./ha), phosalone (0.7 kg a.i/ha), fenitrothion (1.0 kg a.i./ha) and quinalphos (0.5 kg a.i./ha). The residue results showed that phosalone required three days, quinalphos 5 days, methyl parathion 5-7 days and fenitrothion 3 to 5 days as waiting period. The grapes were sprayed with carbaryl (1.0 kg a.i./ha), dimethoate (0.35 kg a.i./ha) and fenthion (1 kg a.i./ha). The fruits required 5 days waiting period for carbaryl and dimethoat while fenthion needed 3 days for the safe consumption of fruits. Bengalgram dusted with phosalone, trichlorfon and endosulfan (each 1.1 kg a.i./ha) recorded residues below the tolerance levels.

Azotobacter chroococcum cells were found to absorb 40.50 ppm of Dasanit during the first week which decreased to 8.00, 4.50 and 1.50 ppm during the subsequent weeks. Disyston (10 and 20 ppm) decreased the total nitrogen in *azotobacter* cells during the first and second week, although at later period it enhanced the N content. Carbofuran, disyston and aldicarb each at 10 and 20 ppm increased the L amylase activity.

R. 1. Ag. Ent. 238 Schemes for studies on the nematode parasites of banana
P. Rajagopalan and T.G. Naganathan

For the control of nematodes associated with dwarf cavendish banana variety, paring and pralinage of suckers with carbofuran 3G (Furadan) at 42 g per sucker before planting and followed by a post-plant application of fensulfothion 5 G (Dasanit) at 20 g per plants six months after planting was the best. The treatment checked the nematodes and increased the yield by 60.9% over untreated control.

R. I. Ag. Ent. 240 Bionomics and control of the mango stemborer, *Batocera rufomaculata* in Tamil Nadu
P.C. Sundara Babu, K. Kaliannan and R. Balagurunathan

The incidence of the pest was seen in all the districts, ranging from 1.08 per cent in Pudukottai to 44.4 per cent in Tirunelveli District. Studies on the effect of the different host plants on the development of the pest indicated that the grub period was the shortest in *Carica papaya* (79 days). Curative control trials revealed that 100 per cent mortality of the grubs was achieved when the above holes were treated with one celphos tablet or solutions of DDVP 0.1% or fenthion (Lebaycid) 0.1% and covered with wet earth.

Some of the common repellants and attractants were not effective on adult beetles. The beetles were not attracted to light also. Studies on seasonal incidence showed the activity of the grubs throughout the year. A fungal pathogen, *Mucor spinoscens* was isolated from the grubs.

R. I. Ag. Ent. 243 Control of pests of turmeric
C.V. Sivakumar

Dipping the turmeric rhizomes for fiteen minutes in 0.5% solutions of either aldicarb sulfone, methamidophos, DDVP, phosalone, monocrotophos or leptophos before planting controls the scale, *Aspidiotus hartii*. The treatment did not affect the sprouting of the rhizomes.

R. I. Ag. Ent. 246 Studies on the cotton stem weevil and its control
Sellammal Murugesan and S. Parameswaran

Single soil application of carbofuran 3 G at 1.0 kg a.i/ha on 10th day of sowing significantly reduced the stem weevil incidence. Alternatively, the spray formulations such as dieldrin, BHC, heptachlor, sevimol, chlordane and monocrotophos all at 0.1%, sprayed four times, commencing from 15th day of sowing at 15 days interval to a run off level on the stem portion and to drench the soil, also were equally effective in reducing the stemweevil incidence.

Cotton varieties CBS. 156 and Varalakshmi were found to be resistant to cotton stem weevil recording 1.6 per cent and 2.5 per cent incidence respectively whereas MCU.5 recorded 52.7 per cent incidence.

. I. Ag. Ent. 247 Studies on the control of pests of chillies
A. Abdul Kareem and P. Thangavel

The chilli white aphid, *Myzus persicae Sulz.* which remained resistant to many common pesticides was effectively controlled by spraying either monitor 50 EC 0.5% (1 lit/ha) or monocrotophos 0.1 (Nuvacron 1.25

lit/ha) plus dichlorvos 0.05% (Nuvan 100 EC-0.5 lit/ha) the percentage mortality of aphids after one week of spraying was 99.9, 96.3 and 92.1 respectively for Monitor, Nuvacron and Nuvacron-Nuvan combination.

R. 1. Ag. Ent. 248 Survey of insect pests of *Parthenium hysterophorus* and *Solanum elaeagnifolium* for the possible biological control of these weeds
S. Javaraj and S. Kumar

Nineteen different species of pests belonging to Homeptera, Hemiptera, Coleoptera and Acarina were recorded on *Parthenium hysterophorus* and nine species of pests belonging to Hemiptera, Coleoptera, Lepidoptera and Acarina were recorded on *Solanum elaeagnifolium*.

R. 1. Ag. Ent. 249 Studies on the nematode parasites of grapevine
P. Rajagopalan and T.G Naganathan

For the control of nematodes associated with grapevine, treatment with nemagon 60% EC at the time of pruning at 20 lit/ha gave 66.6% reduction of root knot nematode population and 54.6% increased yield over control. In nemagon treated vines 15,240, kg of fruits was obtained per hectare as against 6810 kg of fruits in the untreated vines.

R. 1. Ag. Ent. 251 Studies on isolation and screening of naturally occurring insect hormones in plants and insects and their possible role in the insect control
V.T. Sundaramurthy

The synthetic insect hormones viz. Altosid and CRD 499 effectively modified the growth and differentiation of last instar larvae of *Amsacta albistriga* Walker, by bringing out morphogenetic deformities such as larval-pupal mosaic, superlarvae and failure in pupation at 30°C. These hormones also altered the spinning and geotaxis behavior of larvae. The hormonal preparations altered the trophic function of super larvae.

The acetone extracts obtained from *Tagetes*, *Vinca* and *Eupatorium* and steam distillate from *Oscimum* were ineffective against last instar caterpillars of *Spodoptera litura*.

R. 1. Ag. Ent. 104 Studies on antifeeding compounds
A. Abdul Kareem and P. Thangavel

The plant products viz., neem seed kernel and neem oil as powder and 25 per cent emulsion respectively, proved as an effective seed prtoectant for the redgram and greengram seeds against the damage by the bruchid beetles and as valuable antifeedant in protecting the sweet potato leaf against tortoise beetle feeding.

The use of organotin compounds viz., TTA, TTH and TTCl as antifeedants did not affect the activity of either the parasite *Trichogramma australicum* or the predator *Menochilus sexmaculata*, when treating the eggs of *Corcyra cephalonica* and [illegible] respectively

R. 1. Ag. Ent. 105 Studies on insect parasites and predators
P L Lakshman

Field release of larval parasite *Perisierola nephantidis* and pupal parasites *Trichospilus pupivora* and *Tetrastichus israeli* against *Nephantis serinopa* on coconut at Bhavanisagar showed 75% parasitisation of larvae and 63.6% pupae respectively.

Under laboratory conditions, the pupal parasite *Tetrastichus israeli* of *Nephantis serinopa* was found dominant when allowed in different combinations with other pupal parasite *Trichospilus pupivora*.

R. 1. Ag. Ent. 109 Studies on Inseet pathogens
S. Jayaraj, P. C. Sundara Babu, R Jebamoni Robindra and R. Govindarajan

The mineral contents of PIBs of *Amsacta albistriga* nuclear polyhedrosis virus revealed the presence of 0.78, 1.6, 0.04, 0.04, 0.6, 0.03, 0.2 and 0.025 per cent of K, Ca, Mg, P_2O_5, Fe, Cu, Zn and Mn respectively.

Heliothis caterpillar weighing 744 mg body weight yielded 3.85 x 10 PIBs. The growth of the fungus, *Metarrhizium anisoliae* on PDA was maximum (61 mm) at pH 7 while it was the lowest (50 mm) at pH 8.

The mortality of *Tribolium castaneum* was worked out with a dose of 8 x 10 spores/ml of *Farinocystis tribolii*. The maximum mortality of 90 per cent was obtained in the case of 21 days grubs as against 42 per cent in the case of 15 days old grubs.

R. 1. Ag. Ent. 110 Taxonomic studies on plant parasitic nematodes
T. S. Muthukrishnan and G Rajendran

Taxonomic studies on the needle nematodes *Longidorus* and *Paralongidorus* were continued. Species of these two genera were collected from mango, sugarcane, grapevine, turmeric, Jasmine, cotton, pomegranate, crossandra, sapota etc. Detailed studies on *Paralongidorus citri* collected from sugarcane and cotton soil were made.

R. 1. Ag. Ent. 111 Studies on the population dynamics of plant parasitic nematodes
T. S. Muthukrishnan and G. Rajendran

In the crop rotation trial with Tagetes, redgram, tapioca and cholam, it was observed that the test crop bhendi grown after Tagetes has recorded increased yield of 24% over the crop raised in fallow.

Similar studies carried out with root-knot nematode have shown that groundnut and blackgram supported high population of the nematode both in the soil and in the root. Tagetes and DD showed comparatively very low populations. The test crop bhendi grown in these plots have recorded the highest mean root length and shoot length in the Tagetes grown plot. The root knot index was low in fallow (46.9%), Tagetes (46.1%) and DD (54.9%) as compared to blackgram grown plots (189.9%).

R. 2. Ag. Ent. 101 Physiopathology of certain insect pests affected by various microbial pathogens

K. Narayanan, A. Regupathy, G. Santharam and S. Easwaramoorthy

The persistence of nuclear polyhedrosis virus of *Amsacta albistriga* under natural conditions was up to 96 hours of exposure. There was a negative correlation between the persistence and sunshine and rainfall. The thermal inactivation point of the virus was between 90-100°C. At pH 7 the incubation period was minimum and the mortality of caterpillars was maximum.

The NPV of red hairy caterpillar was found to be safe for chicks and white mice as evidenced from their growth rate, and from pathological and clinical tests.

R. 2. Ag. Ent. 203 Infestation control of storage pests

T. Kumaraswami and K. Gunathilagaraj

Activated clay protected sorghum grains from rice weevil for 185 days. Activated clay was treated at four doses, namely, 5 g, 10 g, 15 g, 20 g/kg of blackgram, field bean and cowpea seeds. In all the doses and with all the pulses the protection from the bruchid beetle was for 9 months except with the greengram where it was only for 4 months at 5 g dose.

Coconut oil mixed at 1% level with greengram gave protection against bruchid beetle for 7 months and groundnut oil, gingelly oil and castor oil at the same dose gave protection for 5 months. At the lowest dose tried, namely, 0.25%, all oils were effective for 3 months.

Activated clay, when stored under high levels of relative humidity, tended to absorb moisture and took long time to effect mortality of the insects.

R. 2. Ag. Ent. 209 Chemical control of brinjal fruit borer and mites

C. Ramakrishnan and K. Gunathilagaraj

Soil application of disulfoton at 1 kg a. i/ha followed by four sprays of chlorfenvinphos 0.05%, or seedling dip with metasystox 0.002% followed by four sprays of sevimol 0.1% on 45, 60, 75 and 90 days after planting reduced the incidence of fruit borer.

Metasystox 0.002%, seedling dip followed by foliar spray of phosalone 0.07%, or metasystox 0.002%, seedling dip followed by monocrotophos 0.1% spray on 45, 60, 75 and 90 days after planting recorded the least incidence of mite compared to other insecticides.

R. 2. Ag. Ent. 211 Chemical control of major pests of greengram, blackgram, redgram and horsegram
M. Gopalan, N. R. Mahadevan and R. Rajendran

Seed treatment with carbofuran at 4 g a.i (8 g of Furadan 50 SP) /100 g of seeds followed by a spraying with monocrotophos (Nuvacron) 0.04% at the time of flowering, or soil application of phorate at 1.0 kg a.i/ha at the time of sowing followed by a spraying with monocrotophos (Nuvacron) 0.04% was found effective in controlling all the major pests in blackgram and greengram. The increase in yield over control was 677 kg/ha in greengram and 404 kg in blackgram. The net profits by the above treatments were respectively Rs. 1084 in greengram and Rs. 658 in blackgram.

R. 6. Ag. Ent. 201 Control of major insect pests of acid lime and mandarin
A. Mohammed Hanifa, A. Srinivasan and S. Palaniswamy

Field experiments were conducted for the control of leaf minor *Phyllocnitis citrella* in acid lime with six chemicals viz., methyl demeton, dimethoate, monocrotophos, phosphomidan and phosalone at 0.05 per cent and neemcake extract 1 kg in 20 litre of water. All chemicals reduced incidence from 16.3 per cent in untreated control to 2.3-5.3 per cent. Treatments with dimethoate 0.05 per cent and phosalone 0.05 per cent recorded 100 per cent mortality of citrus butterfly *Papilio demoleus* 24 hours after treatment. Among the indigenous attractants for mandarin fruit fly *Dacus dorsalis*, ethanol extract of *Ocimum* and aqueous solution of protein hydrolysate 8.5 per cent attracted fruit flies.

R. 6. Ag. Ent. 202 Control of nematodes in acid lime and mandarin
A. Mohammed Hanifa, A. Srinivasan and S. Palaniswamy

In a field experiment conducted at Periyakulam for the control of nematodes of acid lime with 4 kg a.i/ha of fensulfothion, aldicarb, carbofuran, phorate and DBCP markedly reduced the soil population of *Tylenchulus semipenetrans* up to four months after application. After four months there was appreciable build up of soil population in all the treatment except DBCP.

R. 9. Ag. Ent. 201 Chemical control of rice pests-Insect pest control trial
K. C. Chandy and S. Kuppuswamy

For granular formulations viz., mipcin, lebacid, folithon and counter at 1.0 and 0.5 kg a.i/ha and nine sprays viz., phosvel, phendal, padan,

nuvacron, bidrin, azodrin, macbal, knockbal and zolone at 0.5 a.i/ha were tried against various pests of rice as compared to a maximum protection treatment and an untreated control. Among these treatments, the sprays viz., padan, phosvel, azodrin, nuvacron, bidrin and phendal effectively controlled the leaf folder. The mean incidence in these treatments ranged from 7.0 to 13.0% against 41.4% in the untreated control. None of the granular formulations was effective.

R. 15. Ag. Ent. 202 Chemical control of groundnut pests
M. S. Palaniswamy and T. K. Ramachandran

In an experiment conducted during 1976 *kharif* with six insecticides (dimethoate, leptophos, phosalone, quinalphos, endosulfan and monocrotophos) at two concentrations (0.025 and 0.05 per cent), phosalone 0.05% and leptophos 0.05% ranked high recording 93.2 and 92.0 per cent of pest reduction, respectively.

In the field experiments conducted with aldicarb, carbofuran, phorate, solvirex and endrin all at 1.5 kg a.i/ha, neem cake powder (100kg/ha) and BHC (25 kg/ha) aldicarb (83.8%) and carbofuran (82.7%) were effective in minimising the incidence of pod borer when applied on 45th day of sowing.

R. 19. Ag. Ent. 203 Control of insect pests and vectors of bhendi and brinjal
A. Mohammed Hanifa

Field experiments conducted at Krishi Vigyan Kendra, Pondicherry, for the control of insect pests and vectors of bhendi with nine chemicals revealed that endosulfan 35%EC (Thiodan) 1 lit/ha, chlorfenvinphos 24% EC (Birlane) 1.5 lit/ha, monocrotophos 40 WSC (Azodrin) 1 lit/ha and phosalone 35% EC (Zolone) 1 lit/ha recorded 5.56, 5.91, 6.55 and 6.56 per cent mean infestation of fruit borer respectively as against 10.69 per cent in control. Treatments with monocrotophos, endosulfan and phosalone gave an yield of 15,140, 14,655, 13,455 and 13,452 kg of fruit yield per hectare while the control recorded an yield of 10,450 kg per hectare.

Incidence of white fly *Bemisia tabaci* and vein clearing disease was less in treatments with chlorfenvinphos, endosulfan and tamaron 40% EC 1 lit/ha.

Treatments with endosulfan, fenitrothion 50% EC (Folithion) 1 lit/ha and methyl demeton 25% EC 0.625 lit/ha recorded lower infestation of red spider mite *Tetranychus telarius*. The cost of chemical including labour charges for the first three rounds of spraying at fifteen days interval and subsequent four rounds of spraying at 10 days interval for monocrotophos, endosulfan and phosalone are Rs. 875/-, Rs. 413/- and Rs. 490/- per hectare. A net profit of Rs. 532/-, 488/-, and Rs. 410/- per hectare repectively is obtained.

R. 24 Ag. Ent 201 Biological control of coconut black headed Caterpillar
M. Swamiappan and C. S. Deivavel

The field survey in the coconut gardens of the Palar river basin of North Arcot District indicated that the incidence of black headed caterpillar, *Nephantis serinopa* found to be seasonal and the infestation almost minimised during winter months The previous season incidence varied from 7.92 to 59.0 per cent attack of fronds. In isolated gardens the incidence could be noticed from November onwards In the field natural parasitization by *Perisierola nephantidis* (Bethylidae) on larva and *Stomatoceras sp.* on pupa and predatory species *Parena lacticenta* feeding on larvae could also be observed Among the larval parasites reared, the newly introduced species namely, *Eriborus trochanteratus* recorded 43-50 per cent parasitization on *Corcyra* larva and 62.5 to 71.0 per cent on *Nephantis* larvae under laboratory conditions.

R. 24 Ag. Ent. 202 Biological control of Apple Woolly Aphid
M Swamiappan and A. Krishnamoorthy

The incidence of apple woolly aphid at Kodaikanal could be seen from July to November and in the cooler months the infestation is found to be minimum, and the natural parasitization by *Aphelinus mali* was to an extent of 61.26 per cent at Kodaikanal and 50.26 per cent at Coonoor in the Nilgiris.

PLANT PATHOLOGY

R. 1. Pl. Path. 205 Control of tikka and rust diseases of groundnut
P. Vidhyasekaran and R. Samiappan

Both in irrigated (Bhavanisagar) and rainfed (Pollachi) crops, Daconil 0.2%, followed by Duter 0.2% and Dithane M-45 0.2% effectivelly controlled rust disease while Bavistin 0.1%, HMP 'MBC' 0.1% Daconil and Duter controlled tikka disease. Duter treatment gave additional profit of Rs. 383 and 852 per hectare while Dithane M-45 gave Rs. 117 and 970 and Bavistin gave Rs. 373 and 783 respectively under irrigated and rainfed conditions in the two field trials. In the trial conducted under irrigated conditions at Sethumadai where only rust disease occurred, Daconil, Duter and Dithane-M-45 controlled the rust disease effectively and increased the yield significantly. The treatments recorded 2625, 2450 and 1850 kg pods/ha respectively, while in control the yield was only 1225 kg/ha.

R. 1. Pl. Path. 207 Studies on sap transmissible virus diseases of vegetables viz., tomato, brinjal, cucurbits and chilli
R. Ayyavoo

Cucumber mosaic virus and potato virus X besides alfalfa mosaic virus caused chilli mosaic disease. Chilli types 112 and 45/3 were resistant to

alfalfa mosaic virus and potato virus X. Carbofuran at 20 kg/ha effectively controlled chilli mosaic disease and recorded an additional yield of 1060 and 800 kg of unripe pods/ha in the two field trials conducted with an additional profit of Rs. 1340 and 940 respectively. Bottlegourd types LS 1, 2, 6, 8, 10 and 12 were field resistant to bottlegourd mosaic virus.

R. I. Pl. Path. 212 Mushroom cultivation
T. K. Kandaswamy and S. Panneerselvam

For paddy straw mushroom (*Volvariella spp.*) cowdung and chopped bits of rice straw were as good as rice straw alone as substrates for spawn. Cowpea vines, hulled maize cobs, maize cob sheaths and poultry manure were poor substitutes compared to other spawn substrates. Adequate starch and low C : N ratio in the spawn substrate increased the yield in paddy straw mushroom. Polythene bags (200 gauge) were successfully used for spawn preparation in place of bottles.

The pigment, *melanin isomer*, was found to be more in *V. volvacia* and *V. esculenta*. The volva and the pileus contained more of the pigments than the stipe and gills. Phenolic glucosides like arbutin, salicin and quercitin increased the growth *in vitro*. Some of the simple phenolics were toxic to *Volvariella*. *Pleurotus sajor-caju* utilised more organic nitrogen substances. Maximum growth and protein content were registered in C : N ratio of 50 : 1. Polyphenol oxidase, peroxidase and laccase enzymes were present in the mycelium and were maximum on 25th day. This mushroom while growing on saw dust released some of the phenolic substances like vanillic, protocatechuic and hydroxybenzoic acids. Protocatechuic acid and hydroxybenzoic acids reduced the activity of the enzyme cellulase and caused poor colonisation of this fungus on saw dust and wood shavings. Maize grain was found to be the best medium for production of spawn

Spent farm waste substrates after growing *Pleurotus* were incorporated into soil and maize was grown. The productive number of cobs were more and yield was statistically significant in such plots compared to the plots where uninoculated farm wastes were incorporated

R. I. Pl. Path. 213 Studies on rice diseases with particular reference to varietal screening for disease control
C. L. Subramanian and S. Natarajan

In the trials on the assessment of varietal reaction to diseases, five cultures viz., 7161, 8427, IR. 79-28-4-1, 79-28-6-1, 1480-28-2-and varieties BAM. 6. BM. 12, HP. 31 were resistant to brown spot. IET. 53, and IET. 2520 exhibited field tolerance to *helminthosporiose*.

Eighteen progenies of various crosses TNAU. (21563, 21586, 21592, 21610, 21632, 21639, 21650, 21652, 21654, 21683, 21690, 21692, 21697, 21707, 21711, 21724, 21725, and 21736) were moderately resistant to bacterial leaf blight.

In the assessment trials for reaction to more than one disease (multiple resistance) rice cultures IET. 3390, TNAU. 8193, TNAU. 8242, TNAU. 8245, TNAU. 8246 and IR. 2071-588-1-6 were moderately resistant to *helminthosporiose*, and sheath rot. Twelve progenies (TNAU.7582, 7609, 13233-1, 16918 16978, 17429-1, 17429-2, 17434-1, 17483-2, 18934, 19193 and 20930) were resistant to bacterial leaf blight, *helminthosporiose* and sheath rot. Twenty-four germplasm types (T. numbers 460, 590, 757, 831, 949, 955, 1033, 1247, 1258, 1278, 1295, 1451, 1505, 1604, 1629, 1637, 1689, 1709, 1718, 1735, 1783, 1922, 1935 and 1943) were resistant to bacterial leaf blight, *helminthosporiose* and sheath rot.

R. I. Pl. Path. 214 Evolving mass screening techniques for brown spot (*helminthosporiose*) disease
C. L. Subramanian

The brown spot resistant variety, Co.20, moderately resistant variety GEB.24 and susceptible varieties Beni Bhog, IR.8 and Kannagi reacted almost in identical manner when treated with the culture filtrate of the pathogen, *Helminthosporium oryzae*; Bheni bhog seedlings wilted at all concentrations of toxin in 3 hours while Co.20, IR.8, GEB.24 wilted in 5 hours. The toxin was also able to inhibit germination of rice, sorghum, cumbu, maize, ragi and blckgram seeds, the percentage of inhibition ranged from 58 to 70%. All these studies indicated that the toxin is a non-specific one.

R. 1. Pl. Path. 215 Control of diseases of sorghum and varietal screening to various diseases
Kousalya Gangadharan and N.Subramanian

Maximum incidence of downy mildew (91.9% in CSV.2) was noticed in *kharif* season among 3 different cropping seasons, namely, summer, *kharif*, and late *kharif*. Downy mildew incidence was negligible in summer and was seen only in highly susceptible varieties 269, 296, 303, 555 and DMS.652.

R. 1. Pl. Path. 216 Control of ergot disease of cumbu
C, Parambaramani

Cumbu sown during the end of July showed only 32.0% ergot incidence and the intensity of infection ranged between 1-15% in different varieries. The incidence was noted only in the earheads from secondary tillers. The intensity of infection was less severe in August sown crops (5-67%) and severe in September crops (4.5-100)

R. 1. Pl. Path. 220 Studies on cotton diseases

Thangamani Narayanaswamy and A. Vinayagamurthi

Duter 0.2%, Kocide 0.2%, Miltox 0.3%, copper oxychloride 0.23%, Cuman 0.2% and Dithane M-45 0.2% when sprayed three times at 20 day, intervals from 60th day of sowing significantly controlled both *Alternaria* leaf spot and rust diseases. The variety CRH.71 was resistant to bacterial blight.

R. 1. Pl. Path. 221 Investigations on the control of decay of fruits and vegetables during storage

K. Seshadri and K. Mohammed Usman

Storage decay of robusta banana fruits caused by *Colletotrichum musae* was controlled by E.9267 oil (0.5%) treatment and it prolonged the storage life of banana by eight to ten days. The quality of the fruits was also unaffected by the treatment. The same oil was effective against storage decay of muscat grapes also.

R. 1. Pl. Path. 222 Studies on diseases of sesamum

N. Shanmugam and M. Kochu Babu

Seed treatment with a combination of captan 0.2% and brassicol 0.3% was found to be effective in appreciably reducing field infection of sesamum charcoal rot (*Macrophomina phaseolina*) by 20.0 per cent. Captan-Brassicol treatment recorded an yield of 668 kg/ha when compared to 568 kg/ha in the control (no treatment) resulting in a net return of about Rs.350/ha.

In the *kharif* (1976) season trial against diseases of rainfed sesamum, sulphur dusting at 30 kg/ha on the 45th and 60th days after sowing was found to be most effective in controlling both *Alternaria* blight and powdery mildew with reduction in incidence of diseases by 63.5 to 77.4%. An yield of 269 kg/ha was obtained in sulphur treatment when yield in untreated plot was only 126 kg/ha and there was a net return of about Rs. 400/ha. From a integrated trial against pests and diseases of rainfed sesamum, it was found that dusting on the 45th and 60th day with endosulfan 4% dust at 20 kg/ha +sulphur at 20 kg/ha effectively controlled *Alternaria* blight, powdery mildew and aphid incidence besides recording the highest yield of 283 kg/ha while in untreated plot the yield was only 162 kg/ha. A net return of Rs.200/ha was obtained from such integrated control.

Seven sesamum varieties viz., Si.259, Si.1168, Si.1276, Si.2370, Si.2157 Si.2567 and Si.2237 were found free from phyllody. Three phyllody resistant varieties, viz., Si.1592, Si.2393. and Si.2726 were also found to be drought resistant. A powdery mildew resistant variety viz., Si.1583 was spotted.

R. 1. Pl. Path. 225 **Studies on virus disease of groundnut**
P. Narayanaswamy and M.Ramiah

The analysis of the results of field trials for the control of virus diseases laid out at Coimbatore and Bhavanisagar showed that the treatment, elimination of virus sources-spacing of 15x15cm and roguing of virus-infected plants up to 45 days after sowing-recorded the minimum disease incidence, the level of disease incidence being significantly less when compared to control and other chemicals except nuvacron. Maximum yield was obtained from plots treated with nuvacron at 500 ml/ha (30 days after sowing) + duter at 1 kg ha (45 and 60 days after sowing) due to control of ring mosaic, tikka leaf spot and rust diseases. The treatment nuvacron + duter, nuvacron alone, solvirex (30 kg/ha) and elimination of virus sources gave additional profit of Rs 940/-, Rs.720/-, Rs.665/-, and Rs.575/- per hectare respectively over control.

R. 1. Pl. Path. 226 Control of diseases of sunflower
V. Narasimhan and N. Prakasam

The loss in yield due to rust disease of sunflower was estimated as 16.5 to 56.7%, depending on the intensity of the disease while due to *Alternaria* leaf spot it was 37.5 to 46.5%. Head rot disease caused a loss of 76.9%. Rust incidence was very low with high day temperatures of 32.0° to 35° C and low relative humidity. The crops sown from middle of December to first week of April showed very low rust incidence (3.4 to 9.8%) while sowings from the middle of May to the end of November showed high incidence (23.9 to 44.3%). The incidence was low in 15 days old crop and it increased with age. *Alternaria* leaf spot incidence was low in the crops sown from the middle of October to first week of February (2.7 to 6.2%). Sowings from the middle of February to the end of September recorded fairly high incidence (7.3 to 18.3%).

R. 1. Pl. Path. 227 Studies on the role of seed-borne microflora on quality of seeds
P. Vidhyasekaran and S. Samiappan

Greengram seeds were invaded by several fungi and the discoloured seeds harboured more fungi. These fungi affected seed germination and seedling vigour. When the seeds were stored in aluminium foil lined bags, microbial attack was very much less. Brinjal, tomato, bhendi and cotton seeds were also invaded by numerous fungi and most of them were virulent pathogens.

R. 1. Pl. Path. 234 Control of betelvine wilt disease
A. Venkata Rao

Copper oxychloride 0.25%, F.M. spray 1.%, bordeaux mixture 0.5%, dexon 0.2%, aureofungin 0.2% + copper sulphate 0.06%, bavistin 0.1%,

benlate 0.1%, hinosan 0.1% and dowco 269 0.3% were tested for their efficacy in controlling the wilt disease. Bordeaux mixture, F. M. Spray, copper oxychloride and aureofungin + copper sulphate were on par and significantly controlled the disease by 50% over untreated control which had 74% wilt incidence.

R. 1. Pl. Path. 235 Studies on the diseases of tuber crops with special reference to tapioca, sweet potato, yam, etc
K. Sivaprakasam

Spray application to the tapioca crop thrice at monthly intervals commencing from the initial appearance of *Cercospora* leaf spot disease with bavistin 0.05% significantly reduced disease incidence.

R. 1. Pl. Path. 236 Investigation on the entomogenous and entomophagous fungi
K. Ranganathan

Aspergillus sp. isolated from groundnut red hairy caterpillar caused 53 per cent death of the caterpillar. The caterpillars died at different stages and all of them were mummified.

R. 1. Pl. Path. 238 Investigations into the fungal diseases of economic forest plantations
K. T. Subba Raj

A wilt disease caused by *Fusarium moniliforme* was observed to occur severely in *Eucalyptus grandis*. *E. citrodera* and *E. alba* were resistant to the disease. Dithane M-45 0,2%, daconil 0.1%, difolatan 0.2%, and blue copper 0.25% effectively controlled the leaf spot disease of bamboo caused by *Helminthosporium* sp. and the disease incidence was 13, 12, 13 and 16 percent respectively in the treated plots while in the control plot it was 36 per cent. A rhizome rot caused by *Fusarium* sp. was also observed in bamboo clumps. Sandalwood was found to be affected by seedling rot caused by *Rhizoctonia solani* and *R. bataticola* in the nursery.

R. 2. Pl. Path. 240 Studies on diseases of grapevine
K. Seshadri and K. Mohammed Usman

Karathane 0.1%, morestan 0.05%, wettable sulphur 0.2%, E. 9267 oil 1%, calixin 0.05%, bavistin 0.1% and F. M. Spray 1% were tested for the control of powdery mildew of grapes. Karathane was significantly superior to all other fungicides in controlling the disease and increasing the yield. This treatment gave an additional profit of Rs. 15,000/ha. A new wilt disease of papaya was found to be caused by *Pseudomonas solanacearum*.

R. 2. Pl. Path. 207 Studies on downy mildew of cumbu
M. N. Alagianagalingam and R. Bhaskaran

A varietal trial with four cumbu varieties viz., Co.6, Uch.1, KM.1 and HB.3 was laid out under rainfed condition in farmer's holding in the village Kalikappan near Ottakadai. HB.3 cumbu variety recorded 24.7% green ear incidence while the other three varieties Co.6, Uch.1 and KM.1 were completely free from the disease.

Co.6, Uch.1 and HB.3 cumbu varieties were analysed for their phenolics and sugar content in 5, 10, 15, 20 and 25 days old seedlings to know the mechanism of disease resistance. The sugar content was more in HB.3 when compared to Co.6 and Uch.1 in all the sampling periods. There was no marked difference in the sugar content between Co.6 and Uch.1 varieties. The phenolic content was more in HB.3 and Uch.1 while the content was less in Co.6.

R. 2. Pl. Path. 210 Investigation on chilli mosaic
M. N. Alagianagalingam and R. Bhaskaran

A field trial was laid out in a private holding at Maravankulam to assess the efficacy of granular insecticides viz., ekalux, solvirex, thimet, disyston and furadan were applied at 0.75% kg per hectare on 15th and 60th day after transplanting. Furadan application recorded reduced disease incidence (3.5%) when compared to control (46.9%).

R. 2. Pl. Path. 212 Studies on groundnut rust
P. Durairaj and R. Mohan

Two field trials on the control of groundnut rust with different fungicides were laid out during the rainfed season (1976) at Fruit Research Station, Periakulam and in a private holding at Alagarcoil. Application of dithane M.45 at 0.2% concentration registered minimum incidence of rust (26%), when compared to control (83%). The other fungicides viz., kocide, sulphur and dithane Z.78 recorded 40%, 43% and 50% of incidence respectively. The treatment dithane M.45 recorded 1000 kg of pods/ha with an increased yield of 52% over control.

R. 2. Pl. Path. 215 Control of black arm disease of cotton
P. Durairaj and R. Mohan

In order to find out the effective dose for streptomycin sulphate trial for the control of black arm disease of cotton on Varalakshmi variety wer conducted in private holdings at Gudaloor and Theni. It was found that th treatment, streptomycin sulphate 300 ppm was superior in recording minimu disease incidence of 0.6%, when compared to other treatments viz., strept

mycin sulphate 200 ppm (1.5%) streptomycin sulphate 100 ppm (2.0%) agrimycin - 100, 30 ppm (2.4%) and dithane M.45 0.25% (5.0%). The control recorded 4.9% disease incidence.

R. 2. Pl. Path. 216 Major diseases of greengram, blackgram, redgram, cowpea and horsegram
Lakshmi Ramakrishnan and P. Padmanabhan

Seedling wilt on greengram appeared in the field during summer season on 15 - 20 days old crop causing 20 to 30 per cent mortality of seedlings while root rot appeared in maturity stage causing 5 to 10 per cent infection. An intensive survey made during *kharif* season on various pulse crops in Madurai and Ramnad districts showed yellow mosaic (2 to 14.12 per-cent in greengram, 1.6 to 22.5 per cent in blackgram and 2-5 per cent in cowpea) and *cercospora* leaf spot (10 - 22 per cent in greengram 8 - 17 per cent in blackgram, 5-29 per cent in redgram and 5-33 per cent in cowpea). Bacterial leaf spot (20 per cent) was noticed in a few places on greengram. Redgram showed sterility mosaic (2.7 to 20.0 per cent). Powdery mildew appeared on greengram, blackgram and cowpea in severe form at the time of crop maturity stage.

R. 6. Pl. Path. 201 Control of virus diseases in acid lime
R. Jeyarajan and K. Balaraman

A large number of declining acid lime trees exhibited bark eruptions, 1-10 cm in diameter. Such trees had very low foliar density and several branches had completely dried. When such trees were indexed on acid lime the test plants reacted with tristeza symptoms so far. Two acid lime trees were selected as sources of mild strain of tristeza based on their vigourous growth and fewer vein flecks.

R. 9. Pl. Path. 201 Studies on bacterial leaf blight
N. Jaleel Ahmed and M. Muthuswamy

In the screening trial for the reaction of rice cultures to bacterial leaf blight, cultures IET. 5943 (N 22 x TN.I) x (T. 90 x IR.8), IET. 6097 (Sona x RP. 9-4) and IET. 6139 (Pelita BLBR. sel). showed resistant reaction while IET. 2866 (IR.8 x (Peta 5 x B. Patna) IET. 3235 (IR. 8 x SLO-13) and IET. 6142 (RP. 4-14 x Te tep) were found to be moderately resistant.

R. 9. Pl. Path. 202 Helminthosporium screening trial
N. Jaleel Ahmed and M. Muthuswamy

Two cultures IET. 5434 (IR. 22 x NP. 130) and IET. 5641 (IR. 8 x R. 24) were found to be resistant to both leaf and grain infection of *Helminthosporium oryzae*.

R. 9. Pl. Path. 204 Survey of rice diseases and insect pests
N. Jaleel Ahmed, K. C. Chandy M. Muthuswamy and S. Kuppuswamy

Survey of rice crop for diseases and insect pests was carried out during the *Kuruvai* season of 1976-77 in the districts of Thanjavur and Tiruchirapalli. Bacterial leaf blight (*Xanthomonas oryzae*) was observed widely in a mild form on ADT 31 and Co. 33. It was severe in two locations in Tiruchirapalli district. Stem rot (*Sclerotium oryzae*) was found in a severe form in two locations in Thanjavur district. Kernel smut (*Tilletia barclayana*) was recorded in a severe form in two locations in Thanjavur district. It was found to be severe in IET. 1722 at the State Seed Farm, Sakottai.

As regards pests, whorl maggot was widely prevalent. Brown plant hopper was recorded in several locations. Hopper burn was observed in a few fields in Moovalur and Poovankulam. Leaf roller was widely prevalent particularly during the month of October. It was severe in seven locations.

R. 9. Pl. Path. 205 Screening of rice varieties for resistance *Helminthosporium* and blast disease simultaneously in the same trial
N. Jaleel Ahmed and M. Muthuswamy

In the evaluation of rice cultures for their reaction to *Helminthosporium* and blast simultaneously, the cultures IR. 26, IR. 28, Bhavani, White Ponni, Dawn, Culture TNVU. 12848, TNAU. 12901 and TNAU. 14562 were moderately resistant to *Helminthosporium* and they were found to be resistant to blast also.

R. 9. Pl. Path. 208 Studies on the incidence of brown plant hopper in known rice varieties resistant to grassy stunt
N. Jaleel Ahmed, K. C. Chandy, M. Muthuswamy and S. Kuppuswamy

A trial was conducted with nine varieties which included five varieties known for their resistance to grassy stunt. Periodical observations of the brown plant hopper population density on crops were recorded. There was not much difference in the brown plant hopper population between the resistant and susceptible varieties. A resistant variety IR. 26 had a population of 3.6 per clump whereas a susceptible variety IR. 22 recorded the lowest population of 1.7 per clump. The highest population of 4.45 per clump was recorded on TN. 1.

R. 11. Pl. Path. 201 Scheme for the investigation of Coconut Wilt Disease in Tamil Nadu
T. Jagannathan and R. Ramasami

Thanjavur wilt disease of coconut was severe during the months of March to September synchronising with a high temperature and low rainfall. Among

the different treatments including fungicides, manures and fertilisers drenching with 40 litres of one per cent Bordeaux mixture at quarterly intervals combined with irrigation during summer months reduced the severity of the disease to a considerable extent.

R. 18. Pl. Path. 201 Screening of the germplasm and other breeding materials for different diseases affecting cotton
M. Vaman Bhat and T. L. Baskaran

IC. 1024, BJA. 592, 101-102B and Reba-B-50 were resistant to bacterial blight.

R. 18. Pl. Path. 202 Control of important diseases of cotton
M. Vaman Bhat and T. L. Baskaran

Streptomycin sulphate at 150 ppm or 200 ppm effectively controlled the bacterial blight. The disease incidence was 14.3 per cent in both the treatments as against 41.0 per cent in control. Cuman at 0.2%, dithane, M. 45 at 0.2%, copper oxychloride at 0.25 % and combination of copper oxychloride at 0.175% and Agrimycin 100 at 0.001% were also on par with streptomycin sulphate in controlling the disease.

HORTICULTURE

R. 1. Hort. 207 Improvement of tomato varieties
C. R. Muthukrishnan and I. Irulappan

One hundred and fifty one tomato accessions were added during the year to the existing gramplasm raising the total to 838. The combination LE 68 x Co. 1 was evaluated in F_4 generation. The yield data indicated the superiority of the hybrid by recording a per plant yield of 1.885 kg as compared to 1.343 kg in Co. 1 and 0.927 kg in LE 68, thus accounting for an increase of 40.3 per cent over the better parent Co. 1.

Two hundred and seventy types were tested in the rainy season and in summer with a view to identify suitable varieties for growing in rainy months and for heat tolerance. The types LE 368 and LE 391 for rainy season and LE 573 and LE 574 for summer were found to be promising in terms of yield, the yield ranging from 2.0 to 2.5 kg per plant as against 0.5 to 0.7 kg in Co. 1 and Co. 2.

R. 1. Hort. 208 Improvement of brinjal through selection and breeding
I. Irulappan and C. R. Muthukrishnan

Thirty two brinjal types were added to the germplasm collection, thus bringing the total to 531. In addition, *Solanum mammosum* reported to be highly immune to fruit borer was introduced for involving it in the breeding programme.

The two pre-release cultures SM. 50-A and SM.2 were compared in an yield trial with the local variety (Varikai). SM. 50-1, SM. 2 and Local (Varikai) recorded a calculated hectare yield of 15691.0 kg, 13394.7 kg and 11739.4 kg. respectively. The increase yield over local was 33.7 per cent in SM. 50-A and 14.1 per cent in SM. 2. The pre-release cultures are being tested now in multi-location trials.

R. 1. Hort. 209 Nutrient and cultural requirements of vegetable crops
K. P. Palaniswamy and I. R. Suthanthirapandian

The dwarf tomato mutant IM 39 tested in a spacing cum manurial trial with four spacings of 60 x 75 cm, 60 x 60 cm, 60 x 45 cm and 60 x 35 cm and four levels of nitrogen fertilizer viz. 100, 125, 150 and 175 kg N/ha indicated that closer spacing of 60 x 30 cm with 56,000 plants/ha receiving 150 kg of N/ha recoreded 60 per cent higher yield over the normal spacing of 60 x 75 cm with 22,000 plants/ha receiving 100 kg N/ha.

R. 1. Hort. 222 Improvement of tuber crops (other than potato)
S. Sathiamoorthy

Evaluation of 749 clones of sweet potato assembled in the germplasm collection was done. The clone IB. 81 was selecied for its superior traits: (i) The clone yields on an average 32.5 t/ha with corpping duration of 125 days while Co. 1 yields 28.0 t/ha with corpping duration of 135 days, (ii) The starch contant was 88.9 per cent on dry weight basis, (iii) The ascorbic acid content was 53.2 mg/100 g and the total carotenoids was 2.1 mg/100 g. IB.81 is being compared with that of Co. 1. in larger extent.

R. 1. Hort. 223 Nutrional and cultural requirement of tuber crops
N. Ramaswamy

Tapioca cuttings were treated with *Azotobacter* with 50, 37.5, 25.0 and 0 basal and 25 kg of N as top dressing and no *Azotobacter* with the above nitrogen treatments at the time of planting. Among the treatments, *Azotobacter* plus 25 kg N as basal dose and 25 kg of N as top dressing has recorded an increased hectare yield of 39,015 kg followed by *Azotobacter* with no basal and 25 kg of N. An additional net profit of Rs. 870/- per hectare was recorded from the treatment with *Azotobacter* combined with the recommended dose of 50 kg N.

Investigations carried out with the growth regulant, ethrel at 250 ppm in three clones of sweet potato viz. IB.3, IB. 2 and IB. 81 on tuber characteristics, chemical constituents and weevil incidence at 10 stages of harvest. The results indicated that the yield of tuber per vine was higher in IB. 81 (491 g/vine) followed by IB. 3 and IB. 2 weighing 469 and 467 g/vine respectively. The ethrel application at 250 ppm increased the tuber yield by 54 per cent over

control with an additional net profit of Rs. 2000 per hectare. The quality attributes relating to starch, amylose, sugars and amylopectin in the clones were influenced by ethrel sprays. In addition, the ethrel treatment reduced the weevil infestation by 52 per cent over control.

R. 1. Hort. 224 Improvement of capsicum, amaranthus and pumpkin
S. Sayed, M. Khader Mohideen and V. Ashok Metha

Chilli: Culture CA (P) 247 was tested with K. 2 in summer 1976. It recorded an estimated yield of 2229 kg of dry pods per hectare accounting for an increased yield of 12 per cent over K. 2 with 1983 kg/ha. CA(P) 247 was tested in 12 locations of Tamil Nadu with K. 1 covering three seasons from 1973-75. CA(P) 247 recored 26.8 per cent increase over K. 1. The mean yield of CA(P) 247 and K. 1 over different locations were 1627 and 1283 kg of dry pods per hectare

Amaranthus: The culture A. 25 was tested at the University Campus, Coimbatore from 1973-76 and also in 16 locations spread out in seven districts of Tamil Nadu. The yield increase over Co. 1 amaranthus variety at 25 and 30 days was 50.4 and 50.2 per cent respectively. Co. 1 gave a mean yield of 2.150 kg (7165 kg/ha) and 3.245 kg (10815 kg/ha) at 25 and 30 days respectively.

A. 25 is characterised by bold seeds and early germination, followed by early vigorous growth resulting in high greens yield within 25-30 days. The appealing green leaf and stem colour and a favourable leaf/stem ratio of 1.8 devoid of fibres are the additional quality factors of this selection. This was released as Co. 2 during the year.

Pumpkin: Culture CM. 37-9 was evaluated with Co. 1 during summer and monsoon 1976. It gave an estimated yield of 25,738 kg and 23,152 kg/ha compared to Co. 1 which recorded 23,183 and 17,639 kg in summer and monsoon seasons rsepectively. The yield increase over Co. 1 variety was 11.0 and 31.3 per cent in the seasons tested.

R. 1. Hort. 226 Pruning investigations in fruit crops
J. B. M. Md. Abdul Khader

Of the two Mulgoa mango trees pruned in August 1976, one recorded profuse off-season flowering upto 70 per cent. A mean of 0.6 per cent fruit-set was recorded in the same. Both the trees flowered in the main season also to an extent of 80 per cent with an initial fruit-set of 1.2 per cent.

R. I. Hort. 231 Training and pruning in grapes
R. S. Azhakiamanavalan

Among the different systems of training of Muscat Hamburg vines, there was no significant difference in yield during the summer and mon-

soon seasons of 1976. However, Pandal and Telephone systems were better than Head and Kniffin systems of training for securing higher yield. The mean weight of bunch in Telephone system was 0.215 kg in summer, 1976 and 0.248 kg in monsoon, 1976 and in Pandal system 0.300 kg in summer 1976 and 0.245 kg in monsoon 1976.

R. I. Hort. 232 Varietal improvement in grapes
S Balasubramaniam

Foundation pruning was given to all the varieties in the germplasm collection. Convent Large Black which gave the highest yield in cane pruning, failed to perform well in foundation pruning, whereas Black Champa, Oval White, Black Cornichon continued to perform well even after foundation pruning indicating that the basal buds are also fruitful in these varieties. Oval White gave 47 bunches weighing 4.8 kg/vine followed by Black Champa 29 bunches (3.9 kg) and Convent Large Black 24 bunches (3,2 kg).

R. I. Hort. 236 Mutation breeding in tomato and brinjal
C. R. Muthukrishnan and I. Irulappan

The dwarf mutant IM. 39 when tested in a yield trial recorded on an average 28 fruits per plant weighing 1.077 kg. The dwarf stature of this mutant was explored for high density planting in a spacing trial. The results showed that a closer spacing of 60 x 30 cm accommodating 56000 plants/ha gave 58 per cent increased yield over the recommended spacing of 75 x 60 cm with 22000 plants/ha.

R. I. Hort. 240 Improvement of Cucurbitaceous vegetables through selection and mutation breeding
S. Sundararajan and C. R. Muthukrishnan

A high yielding bittergourd selection MC. 77 (Coimbatore Long Green) continued to be superior when compared to M C. 44, M C. 43 and M C. 8 This selection is shorter in duration by 10–15 days as compared to these types with 125-130 days. The plant is medium spreading accomodating 6000 plants/ha at the rate of three plants per pit with a spacing of 2.5 x 2.0 m. The fruits are ready for harvest in 65-70 days after sowing. The fruits are long green (30-35 cm) weighing 100-120 g each with a per plant yield of 20-22 fruits on an average. A hectare yield of 15.000 kg with a per day production of 131.0 kg has been recorded in MC. 77 when compared to local with a hectare yield of 12,800 kg with a per day production of 101.0 kg accounting for an increased yield of 14.0 per cent over local.

The bottlegourd accession LS-2 (Round fruited with a prominent neck) is a medium duration selection with 120 days when compared to other types (135-140 days). The plant is medium spreading accommodating

6000 plants per hectare at the rate of 3 plants per pit with a spacing of 2.5 x 2.0 m. The fruits are ready for harvest in 75-90 days. It yields 19,200 kg/ha in 120 days with a per day production of 160.0 kg when compared to local with a mean hectare yield of 16,100 kg in 130 days with a per day production of 123.8 kg.

R. I. Hort. 241 Hybridization in sweet potato and mutation breeding in tapioca and sweet potato
S. Sathiamoorthy and C. R. Muthukrishnan

Using Co. 1 variety of sweet potato, 2250 crosses were made with clones having high yield and better tuber qualities. About 200 seeds were secured from these crosses and were sown in the nursery.

A critical evaluation of 90 clones of seed irradiated mutants of tapioca indicated that the clone ME 116 was found to yield 5.4 kg of tubers per plant while it was 0.880 kg in Co. 1 variety.

R. 1. Hort. 249 Evaluation of different species and varieties of jasmine for essential oil
Seemanthini Ramadass

Work on standardisation of the procedure for extraction of jasmine oil was continued. It was found that the flowers picked and processed beyond 11 a.m. registered a lower recovery of concrete than those picked and processed earlier. Laboratory purification of Food Grade Hexane which is used as the solvent for the extraction increased the cost of the solvent from Rs. 4 to Rs. 40, thereby narrowing down the margin of profit considerably.

R 1. Hort. 270 Breeding for multiple resistance to pests and diseases and for heat tolerance in tomato
C. R. Muthukrishnan, I. Irulappan, N. Venkata Rao A. Azeez Basha, R. Ayyavoo and V. Sivakumar

Two hundred and eighty four types were screened under unprotected field conditions for fruits borer and *Alternaria* leaf spot. Thirty accessions recorded an incidence of less than 10 per cent and 11 accessions recorded less than five per cent incidence as regards fruit borer. The accessions LE.663, LE. 666 and LE. 668 exhibited fairly good tolerance to *Alternaria* leaf spot by recording only 10, 5 and 10 per cent incidence respectively.

Fifty germplasm types were screened under laboratory conditions for *Rotylenchulus reniformis* (reniform nematodes). All the varieties showed multiplication of the nematode, but it was considerably less in the varieties LE. 493, LE. 516, LE. 542 and LE. 629. All the germplasm accessions tested so far (two hundred) under laboratory conditions were susceptible to virus diseases and the disease incidence ranged from 40 to 90 per cent.

R. 1. Hort. 271 Breeding for multiple resistance to pests and diseases in bhendi
C. R. Muthukrishnan, R. Arumugham, S. Uthamasamy
A. Azeez Bhasha and A. Venkata Rao

A total of 147 cultivars/accessions collected from within the country were screened for resistance to yellow vein mosaic and powdery mildew diseases and for aphids, jassids and fruit borer under field conditions. There was a low incidence of five per cent in AE-138 while other accessions were susceptible to yellow vein mosaic disease. All the accessions tested were susceptible to powdery mildew.

The accession AE 30 was resistant to jassids while AE 3 was moderately tolerant. AE. 1 and AE. 113 were tolerant to mite infestation while AE. 112 was moderately tolerant to root knot nematodes.

R. 1. Hort. 275 Vegetative propagation studies in fruit crops
J. B. M. Md. Abdul Khader

Air-layering of past seasons growth of mango and guava during August and September with treatments of IBA at 10,000 ppm concentration recorded 40 and 70 per cent success respectively.

R. 1. Hort. 283 Varietal evaluation and development of suitable varieties of cauliflower for the plains
K. G. Shanmugavelu and S. Anbu

Among the 30 varieties, Jawahar Moti was the earliest to come for harvest (88 days) followed by Hot Weather cauliflower (90 days,) Early Market, Main Crop Banaras and Second Early (91 days) whereas the varieties Early Snow Ball, Patna Main Crop and Snow Ball No 16 were late (119-122 days.) In respect of yield, the highest mean curd weight was recorded in Milky White and Mamooth Maghi (291 g) followed by Glory of India, Silvery King and Patna Main Crop. The variety, Main Crop Banaras recorded the highest ascorbic acid content (89.43 mg/100 g) followed by Second Early and Snow Ball No.16.

R. 1. Hort. 285 Varietal evaluation and development of suitable varieties of garden peas
K.G. Shanmugavelu and P. Chockalingam

Studies on the performance of forty varieties of garden peas was studied. The type PS 12 was the earliest to come for first harvesting of green pods. In respect of yield per plant, PS.21 recorded the maximum yield of 61.62 g/plant followed by PS.19 (49.68 g/plant).

R. 1. Hort. 294 Improvement of melons
S. Sundararajan

Seventy types of muskmelon (*cucumis melo*), two types of long (*Cucumis melo* var. *utilissimus*) sixty five types of water melon (*Citrullus vulgaris*) and four types of round melon (*Citrullus vulgaris* var. *fistu-flsus*) have been assembled for evaluation.

R. 2. Hort. 210 Studies on the effect of graded doses of potash on the performance of guava
R. Subbiah and K. Rajasekaran

The results of potash application indicated that application of K_2O at 1.0 kg/tree increased the mean yield by 114.2, 54.2 and 36.0 per cent by weight in Smooth Green, Lucknow-49 and Chittidar varieties. Application of potash also helped to increase the TSS of fruits by 1.8, 1.7 and 1.6 per cent in these three varieties respectively.

R. 2. Hort 212 Breeding superior varieties of jasmine
R. Subbiah and K. Rajasekaran

In a mutation breeding trial among the varying doses of gamma rays, 25 KR has produced a short-statured, high yielding mutant in *Jasminum grandiflorum*. This mutant continued to give a three-fold higher yield (33,685 flowers) in comparison to the untreated control (11,167 flowers).

R. 6. Hort. 201 Improvement of mango through selection and breeding
S. Thamburaj and J.B.M Md. Abdul khader,
S. Balasubramaniam, R. Jayarajan

One seed in each of the following three combinations were obtained during the year and sown in the nursery: Neelam x Mulgoa, Pottalma x Neelam and NeelamxPottalma. The seeds of the two crosses only viz., Neelam x Mulgoa and Pottalma x Neelam germinated and established and the seedlings were transplanted on 2.11.1976. The seedlings of the combination Neelam x Mulgoa and Neelam x Pottalma planted in 1974 are coming up satisfactorily.

R. 6. Hort. 209 Introduction and study and performance of new kinds and varieties of horticultural crop plants
S. Thamburaj, J.B.M. Md. Abdul khader, R. Jayarajan

In Atemoya, the per tree yield ranged from 50 to 103 fruits weighing 10.21 to 25.85 kg. Hand pollination increased the fruit set to 43.4 per cent when compared to 2.0 per cent in control, thus indicating the need for hand pollination for improving the fruitset in Atemoya. In West Indian Cherry, an average yield of 7.02 kg of fruits per tree was recorded during the period. Star goose-berry trees gave a mean yield of 7.7 kg per tree during the year the highest yield being 20.5 kg per tree.

R. 6. Hort. 210 Improvement of tomato through selection and breeding
O. Anchanam Alagia Pillai, R. Jeyarajan and B. Bellukutty

Among the four tomato cultivars and four types studied, the cultivar SL. 120 performed well as adjudged by the yield of 31.8 tonnes per hectare which is 48.5 per cent higher than the local cultivar, Annanji. The cultivar SL. 120 has given an additional net profit of Rs. 3000/- per hectare. The two high yielding mutants (Culture I and II) were selected from Annanji parent and were under multilocation trials. Culture I yielded 1238 g per plant as against 962 g per plant in Annanji and the increase in yield was 26.6 per cent. In order to find out the correct spacing for the mutant, a trial was laid out. The spacing of 45 x 30 cm yielded 35.5 tonnes per hectare as against 18 tonnes per hectare in 60 x 30 cm spacing.

R. 6. Hort. 218 Improvement of planting material for acid lime
S. Thamburaj, S. Sathyamoorthy and R. Jeyarajan

The rootstock seedlings of Trifoliate orange, Troyer citrange, Rangpur lime, Rough lemon, Savage citrange, Tambhiri, Jatti katti, Cleopatra mandarin, Gajanimma and *C. macrophylla* were raised. Two accessions of acid lime were collected from Gudalur and Sirumalai based on mother tree performance. The weight of fruits in these two accessions ranged from 45.6 to 54.5 g as against 40.2 g in the local type. Their juice content was 21.9 and 24.6 ml per fruit whereas the fruits of local type contained only 15 to 18 ml of juice per fruit.

Observations recorded in the pilot cum demonstration plot in mandarin indicated the superiority of Kodakithali as a promising rootstock. The buddlings had smooth bud union. The mean height, spread, scion girth and stock girth were 114, 38, 1.7 and 1.2 cm respectively. The figures for plants on Troyer citrange rootstock were 99, 33.5, 1.7 and 1.2 cm respectively.

R. 6. Hort. 219 Influence of growth regulants on fruitset, fruit drop and quality of acid lime and mandarin
S. Thamburaj, S. Sathyamoorthy, M. Nagarajan and S. Subramaniam

In acid lime, all the growth regulants tested viz. 2, 4, 5-T, G.A, 2,4-D and NAA increased the fruitset. The fruitset was improved from 43.1 per cent in control to 68.4 per cent when sprayed with 2, 4, 5-T at 20 ppm. The weight (28.7 g), diameter (3.8 cm) and juice content (14.1 ml) were the highest in the trees receiving this treatment when compared to 23.8 g, 3.5 cm and 11.0 ml respectively in the control. The TSS and acidity were not influenced by these growth regulants. In mandarin, spraying 2, 4, 5-T at 10 ppm improved fruitset by 59.2 per cent over control. The weight (78.2 g), diameter (6.1 cm) and juice content (24.3 ml) of fruits were also improved by this treatment. Like in acid

lime, the TSS and acidity were not influenced in mandarin by the use of growth regulants.

R. 7. Hort. 201 Improvement of apples through introduction and selection
M. Rangaswamy and S. Jamal Hussain

The assessment of the performance of 120 varieties of apples assembled from different parts of India and also from different countries, revealed that the varieties Carrington (801 fruits - 50.0 kg) and Irish Peach (672 fruits - 44.8 kg) were best among early types. Kodaikanal-1 (435 fruits - 53.8 kg), Winter Banana (282 fruits - 36.2 kg) and Parlin's Beauty (271 fruits - 38.6 kg) were best among mid season types. Tropical Beauty (255 fruits - 43.5 kg) and Giant Jeniton (250 fruits - 32.6 kg) were best among late types. The above varieties revealed their superiority not only in yield but also in quality. The income for the above varieties ranged from Rs. 130/- to Rs. 200/-per tree against an expenditure of Rs. 50/- per tree. These varieties are being multiplied and distributed to farmers for large scale cultivation.

R. 7. Hort. 202 Propagation and rootstock investigation in apple
R. Balakrishnan

Wip and tongue method of grafting is the best method of propagating apple. The optimum period for propagation is found to be from November to February.

Rootstocks M. 779 and MM. 110 induced the highest yield of fruits per tree (39 and 20 fruits respectively) and the lowest yield was recorded by Coonoor crab (1 fruit/tree). Among the rootstocks M. 779 and MM. 110 can be used as optimum rootstocks for apple.

R. 7. Hort. 205 Picking, packing and storage studies of apples
L. Veerannah

Packing apples in the cases with saw dust proved to be the best method for transport of apples by road and rail with least damage (46.0 per cent). Wrapping the fruits in polythene film of 150 gauge was observed to prolong the storage life of apples upto 30 days. Fruits of Parlin's Beauty coated with 4 per cent wax emulsion stored well upto 105 days at room temperature.

R. 7. Hort. 213 Studies on the propagation of geranium and mint
R. Balakrishnan

Studies were undertaken to find out the utility of the growth regulators in inducing rooting in middle and basal cuttings which are hitherto wasted. IAA at 500ppm induced more number of roots in basal cuttings (320.0 %) and in middle cuttings (1225.0 %) while IAA 200 ppm was effective in terminal cuttings (683.8 %) over control. IBA at 500 ppm induced better

rooting in basal cuttings (263.0 %), while 200 ppm was the best in middle (1382.5 %) and terminal (227.0 %) cuttings over control. Ethrel at 1000 ppm was effective in inducing rooting in basal cuttings (236.0 %).

Mint (*M.citrata*) plant can be propagated quickly and easily by deploying stem with one leaf. More planting material could be obtained for large scale cultivation within a short period of 30 to 45 days after planting. Mint plant requires atleast a minimum of one leaf for establishment as the survival in stem without leaves was very meagre.

R. 7. Hort. 224 Varietal evaluation and development of suitable varieties of cauliflower.
H. Ahmad Shah and S. Jamal Hussain

Seventeen varieties in cauliflower were introduced to study their suitability to Kodaikanal. The variety Kibogiant introduced from Ootacamund was assessed to be the best among all the varieties. It had a mean curd weight of 1.040 kg per plant which was higher by 30.5 per cent over the variety Snow Ball. The curds were compact, milky white with a diameter of 18.84 cm and the duration was 134 days. This was followed by Snow Ball and Snow Ball 16 with mean curd weights of 0.797 kg and 0.749 kg respectively taking 127 days of their entire duration.

R. 7. Hort. 242 Trace element studies in geranium
R. Balakrishnan

The yield of herbage showed that application of Zn and B at 20 kg per hectare recorded the highest yield of 185.7 per cent over control followed by Zn at 20+B at 10 kg per hectare (153.2 %), B at 10 kg/ha (149.8% and Zn 40 kg + Mn at 10 kg/ha (149.5 %). Growth characters and yield of herbage were greatly influenced by higher Zn or B alone or in combination of these two metals. The efficacy of Mn is not so great as Zn or B.

R. 7. Hort. 226 Varietal evaluation and development of suitable varieties of cabbage
H. Ahmad Shah and S. Jamal Hussain

The variety Early Wonder when transplanted in February recorded the highest yield with a mean head weight of 1.195 kg per plant followed by the varieties, All season and September with 1.108 kg and 1.020 kg respectively. This was 57, 46 and 34 per cent higher over the local respectively. Among the varieties transplanted in July '76, the variety September introduced from Ootacamund gave the highest yield with a mean head weight of 1.334 kg per plant and this was 74.15 per cent higher over the control, which recorded a mean head weight of 0.766 kg per plant. The variety September possessed

a well compact round head highly suitable for the August - September transplanting with an estimated yield of 65.9 tonnes per hectare.

R. 7. Hort. 228 Varietal evaluation and development of suitable varieties of peas
H. Ahmad Shah and S. Jamal Hussain

The variety Telephone was the highest yielder with estimated yield of 9.0 t/ha followed by 8.33 t/ha and 8.17 tonnes in Invincible Marrowfat and Blue Bentam respectively during January-May 1976. During June-October 1976 season, the varieties Telephone and American Champion recorded an estimated yield of 8.67 tonnes per hectare, which was 216.74 per cent increase over the standard Bonneville (Sutton). The varieties Telephone and American Champion were 124 days in duration.

R. 7. Hort. 233 Selection and improvement of high yielding varieties of beans (Bush and Poletypes)
G. Paranjothi

Among the four types of pole beans tested in the comparative yield trial during May-July '76, Earliest of all recorded highest yield of 20.915 t/ha followed by French White (12.160 t/ha).

R. 7 Hort. 234 Evaluation and improvement of radish
G. Paranjothi

A comparative yield trial was conducted with 19 types of radish Variety Long White recorded maximum yield of (55.416 t/ha) which was 49.2 per cent higher than Pusa Rashmi (36.134 t/ha).

R. 7. Hort. 235 Standardisation of seed production techniques in cabbage and cauliflower (at lower elevation of Kodai hills)
G. Paranjothi

In a trial to evolve a suitable technique for seed production in cauliflower (Indian Snowball) during April - May '76, the plants flowered without any treatments after the formation of curds and set seeds. The mean yield of seeds per plant was 3 g. In the case of treated plants viz. (i) transplanting after the formation of curds and (ii) allowing the stumps after harvest, the flowering and seed setting could not be observed.

R. 14. Hort. 101 Germplasm collection and description of types and varieties in cashew
C. M. Pappiah and A. Shahul Hameed

In the germplasm collection 177 types comprising of 169 indigenous and 8 exotic types are under trial. The selection from Madras M. 26/1 leads

the rest in yield and medium size nuts with mean tree yield of 32.8 kg. The other selection M. 35/2 recorded 17,200 kg per tree with medium size nuts (5-8 g). Among them eleven types were identified for high yields of more than 10 kg per tree.

R. 14. Hort. 201 Hybridization and selection in cashewnut
A. Shahul Hameed and C. M. Pappiah

One hybrid evolved with the parentage of M. 10/4 x E. 4/2 recorded off-season flowering. This hybrid produced 87 nuts weighing 640 g. The nuts are medium in size.

R. 14. Hort. 202 Progeny trial in cashew
C. M. Pappiah and A. Shahul Hameed

All the 26 clonal progenies have produced flowers and fruitset. One progeny K. 20/5 maintained its superiority with the high yield of 15.350 kg of nuts/tree which was followed by ME. 1/1 produced 9.100 kg of nuts/tree.

R. 14. Hort. 206 Hormonal application to increase the fruitset in cashew
C. M. Pappiah and A. Shahul Hameed

Foliar application of growth regulants IAA at 50 and 100 ppm; IBA at 50 and 100 ppm, NA at 10 and 20 ppm; 2, 4-D at 4 and 10 ppm and control as no spray were given once at the time of flower opening and another at the time of fruitset. Foliar spray of 2, 4-D (5 ppm) increased the fruitset and recorded the highest yield of 5.589 kg of nuts per tree which was closely followed by the 2, 4-D 10 ppm (4.469 kg) whereas control recorded only 2.465 kg/tree. Spraying with 2, 4-D (5 ppm) recorded 126% more yield than control with an additional profit of Rs. 2450/- per hectare.

R. 14. Hort. 210 Studies on intensive cultural trial in cashew
C. M. Pappiah and A. Shahul Hameed

Cultural treatments like irrigation, manuring, interculture and plant protection enhanced the yield by 180 per cent over control. The additional expenditure and profit will be Rs. 1780 and Rs. 950 per hectare respectively.

R. 17. Hort. 101 Evaluation of germplasm of *Capsicum* under irrigated conditions
P. Rangaswamy and S. Annadurai

Among the 126 types established in the field 16 types had recorded higher yield than standard K. 1 chilli on single plant basis, the higher yield ranging from 1.67 to 177.3 per cent. Four erect fruit bearing types of chillies which showed easy destalking character had been isolated.

R. 19. Hort. 201 Varietal evaluation in tapioca and sweet potato under Pondicherry conditions
S. Sambandamurthy

In an observational trial with seven varieties of tapioca it was found that the hybrid H. 226 registered the highest yield of 42.486 t/ha followed by the variety Co. 1 with 40.890 t/ha.

R. 19. Hort. 202 Varietal evaluation in tomato, brinjal, bhendi, amaranthus and cowpea
S. Sambandamurthy

In tomato a trial with 17 varieties including 7 heat tolerant strains from Taiwan were tried in the monsoon season from August to November 1976. The strain No. 571 from Taiwan gave the highest yield of 13,994 kg fruits/ha followed by the variety Sioux with 13,702 kg fruits/ha. The mutant IM. 69 and three other strains from Taiwan viz. 573, 575 and the variety Hissar have performed satisfactorily, yielding more than 10,000 kg/ha. In all the varieties, fruit splitting was noticed after rains.

In brinjal, the yield data recorded in the varietal trial with four varieties viz. Pusa Purple Long, Punjab Chamkila, Annamalai, Thengathittu and two cultures SM. 50 A and SM. 2 indicated that Punjab Chamkila and Pusa Purple Long are superior in yield with 36.78 and 36.89 tonnes of fruits/ha, while the local variety Thengathittu gave the lowest yield of 20.89 t/ha. Culture SM. 2 and SM. 50A from Coimbatore recorded 25.89 and 21.45 t/ha respectively while the variety Annamalai yielded 22.67 t/ha. The variety Annamalai and the culture SM. 2 have a better consumer appeal and are preferred to other varieties.

R. 20. Hort. 201 Studies on the control of bunchy top disease using albolineum oil
M. Kulasekaran and E. Vadivel

The albolineum oil, an antiviral chemical, supplied by ICI, Calcutta was tried for its efficacy in the control of bunchy top disease in hill banana. Nineteen sprayings were made at the interval of 21 days.

The observations made so far have not proved the favourable effect of albolineum oil for the control of bunchy top virus as the data from different localities did not reveal its effectiveness uniformly. More over, its efficacy was found inferior when compared to the application of Furadan granules alone.

R. 21. Hort. 203 Study of suitability of cabbage varieties for rainfed cultivation
S. Muthuswamy and T. Thangaraj

Among the 19 varieties tried under rainfed conditions in the main season, three varieties have shown promise, viz., BOC-9 (mean diameter of head 15.0

cm; mean weight of head 511 7 g), BOC-17 (mean head diameter 11.5 cm; mean head weight 450.0 g) and BOC-13 (mean head diameter 9.9 cm, mean head weight 366 0 g).

R. 21. Hort. 204 Study of performance of cauliflower varieties under rain-fed cultivation
S. Muthuswamy and T. Thangaraj

A total of 16 varieties were tried in the main planting season. Three varieties have shown promise under rainfed conditions. They are BOB-14 (mean flower diameter 12 3 cm; mean flower weight 103.3 g), BOB-9 (mean flower diameter 11.6 cm; mean flower weight 122.5 g) and BOB-8 (mean flower diameter 8.9 cm; mean flower weight 100.7 g).

R. 21. Hort. 206 Varietal studies in beans
S. Muthuswamy and T. Thangaraj

A total of 58 varieties were studied in June planting. Of these, 18 Bush Bean varieties have been found promising yielding more than 300 pods per 50 plants. In September planting, 10 varieties yielding more than 150 pods per 50 plants were noted to be promising. Based on the performance in both the seasons, varieties PV. 46, PV. 30, PV. 18, PV. 20 and PV 12 have been selected for further evaluation in 1977 plantings.

FORAGE CROPS

R. 1. Forage 201 Studies on interspecific hybridisation in genus *Sorghum* for improving tillering and hardiness
N. R. Chandrasekaran

Nine varieties were tested for green fodder yield in a comparative yield rial during 1976 *rabi* season with Co. 11 as control. Of these, 321, 560 C and 551 E, derivatives of Co. 11 X *S. halepense* gave a per day production of 3.16, 3.09 and 2.92 q/ha respectively as compared to 3.81 of Co. 11 cholam. n duration also, variety 321 was shorter to Co. 11 by six days.

R. 1. Forage 204 Synthesis of new hybrid varieties in Cumbu-Napier (*Pennisetum typhoides* X *P. purpureum*) and assessment of existing ones for fodder
P. Chandrasekharan and M. Balasubramanian

Twenty two hybrids of Cumbu-Napier from different sources in the ountry were assessed for green fodder yield with NB.21 as control. The ybrid BN.2 was outstanding recording 208 t/ha/year in nine cuts compared to 37 of NB. 21, the yield increase being above 50%. The hybrid BN.2 is under pid multiplication for the conduct of district trials.

R. 1. Forage 205 **Induced mutagenesis in Guinea grass (*Panicum maximum*) and Para grass (*Brachiaris mutica*) and isolation of better clones**
A. K. Fazlullah Khan

Slips of guinea grass and para grass were subjected to gamma rays at 0, 1, 2, 3, 4 and 5 KR. The LD_{50} dose for survival was found to be 2 to 3 KR for guinea grass and 5 KR for para grass. Increased doses of irradiation affected the metric traits in both the grasses. Seeds from both the species have been collected and irradiation will be done after the dormancy period is over.

R. 1. Forage 210 Exploitation of fodder potential of perennial plants and selection of superior types based on yield and nutritive value
M. Balasubramanian and A. Gopalan

Leaves from seventeen avenue trees and perennial shrubs collected from the University Campus and analysed for nutritive value, showed the following species to be best in certain characteristics (mentioned within brackets)

Leucaena glauca (18.64% crude protein)
Tamarindus indica (15.90% ash)
Holoptelea integrifolia (10.35% crude fat)
Desmanthus virgatus (71.98% carbohydrate phosphorus)
Enterolobium saman (3.68% calcium)

FORESTRY

R. 1. Forestry 201 Agronomic studies on nursery stock of local bamboos - I. *Dendrocalamus strictus*
S. Kondas

Neither nitrogen levels nor spacing levels exercised any influence on the growth attributes. A pot study has been initiated to investigate this lack of response.

R. 1. Forestry 202 Agronomic studies on nursery stock of local bamboos-II. *Bambusa arundinacea*
P. Seshadri, S. Kondas, P. Kasiviswalingam and M. G. Dasthagir

In general there was no response, either to nitrogen or spacing levels in almost all the characters studied. A pot study was initiated to investigate this.

R. 1. Forestry 203 Studies on production techniques of bamboo rhizome propagule (*Dendrocalamus strictus* and *Bambusa bambos*)
P. Seshadri, S. Kondas, P. Kasiviswalingam and M. G Dasthagir

Experiments revealed that in the case of *Bambusa bambos* cut bits of the rhizome chain do regenerate and that the regenerative ability is positively associated with the weight of the cut bits. Also rhizome chain bits derived from very young (less than about 6 months) seedlings do not regenerate. These conclusions need confirmation.

R. 1. Forestry 208 Genetic improvement of bamboos I. *Bambusa arundinacea* syn. *B. bambos* - Grading, selection and mutation breeding
S. Kondas

Studies initiated during the period under report have indicated that the LD_{50} dose for *Bambusa bambos* is around 16 Kr. The biometrical observations are being recorded for the M_1 population.

SEED TECHNOLOGY

R. 1. Seed Tech. 101 Standardising seed testing procedures and vigour assessment techniques
V. Ramakrishnan, C. Dharmalingam and K. K. Vadivelu

Arabica coffee seeds when tested in sand medium at 35$\pm$2°C and 90$\pm$5 per cent relative humidity took nearly 39 to 52 days for the first seedling to emerge and reach the 'soldier stage' or 'topee stage' and the period of emergence varied from 38-66 days. From 'topee stage' to normal seedling stage it took about 40-61 days. Thus the duration of germination count varied from 99-137 days depending upon the cultivars.

R. 1. Seed Tech 201 Standardising quality seed production in sorghum
G. Thulasidas and Jacqueline A. Selvaraj

A field trial involving two spacings viz., 45 cm x 15 cm and 45 cm x 22.5 cm and three levels of N, P_2O_5 and K_2O in 27 combinations was laid out with Co 21 sorghum in *rabi* season of 1976-77. It was found that the closer spacing of 45 cm x 15 cm gave a significantly higher yield (4,424 kg/ha) than the wider spacing of 45 cm x 22.5 cm (4,154 kg/ha). It was also found that with P_2O_5 at O and 30 kg/ha and K_2O at 30 and 60 kg/ha, closer spacing was better than wider spacing. With wider spacing, P at 60 kg/ha was superior. The conclusion

is that higher plant population gives a significantly higher yield than lower plant population.

Studies showed that this variety attained physiological maturity 45 days after anthesis. At this stage, the seed moisture content was 30.4 per cent and the field emergence was 90 per cent.

R. I. Seed Tech. 202 Evolving suitable techniques for the production, processing and storing of parental and hybrid seeds of *bajra* and maize
K. R. Ramaswamy, T. V. Karivaratharaju and C. Ramalingam

Maize cobs of single cross CM 114 x CM. 115 with a moisture content of 12.5 per cent were shelled and the seeds were evaluated for the type and extent of mechanical injuries. Majority of the seeds received multiple breaks on the endosperm extending up to the embryo. The intensity of infection in terms of bacteria, internal and external fungi and the production of abnormal seedlings were more for seeds with a cut extending into the embryo and for those with irregular pericarp breaks with a transverse cut into the embryo. Immediate slurry treatment of seeds with thiram 75 per cent WDP at 70 g/100 kg seeds in 0.5 litre water proved effective in reducing the occurrence of abnormal seedlings and improving the field stand.

To determine the influence of different levels of N, P_2O_5 and K_2O (0:0:0, 28:14:9 and 56:28:18 kg/ha) and spacing (45 x 10 and 45 x 15 cm) on the yield of quality seeds (Co.6 *bajra*), a trial was laid out with 3^3 fertilizer combinations during July - October, 1976 in two replications. The crop came to maturity in about 90 days irrespective of treatments. The yield differences were significant due to phosphorus levels, the higher level of P (28 kg/ha) giving higher seed yield of 2,950 kg/ha. There was no significant difference in yield due to N and K and also spacings. When the different levels of P were compared individually with N-0, N-1 and N-2, it was found that the application of 28 kg in each of N and P_2O_5 had given the highest yield of 3,109 kg/ha.

When the seeds were size graded the mean seed recovery was 81 per cent in 5/64" round perforated metal sieve which was found to be optimum, since the seeds of this grade gave a maximum of 88 per cent germination on an average.

R. I. Seed Tech. 203 Studies on standardisation of seed production techniques in tomato
K. K. Vadivelu

Seed development and maturation study with variety Co. 2 revealed that the seeds collected from 40 day-old fruits have recorded the maximum

germination of 90 per cent. Flower thinning was found to have no influence on total seed yield, though retaining two flowers per inflorescence was found to enhance the recovery of quality seeds by eight per cent. Spraying of CCC at 2000 ppm at early flowering stage enhanced the total seed yield by 11 per cent and recovery of graded quality seeds by five per cent of that of the control.

Seed viability studies indicated that seeds, irrespective of seed treatment or storage container were found to maintain the initial germination of 85 per cent even after one year of storage under ambient conditions of temperature and relative humidity. The vigour potential of the stored seed as measured by dry mattrer production was also maintained during the storage period.

R. 1. Seed Tech. 204 Standardisation of seed production techniques in brinjal
G. Thulasidas and Jacqueline A. Selvaraj

Fruits of SM. 50A brinjal were collected at intervals of five days starting from 20th day after anthesis. The weight of fruits and seeds, moisture content, 1000-seed weight, germination and dry matter accumulation were studied. The data gathered indicated that the seeds reached the physiological maturity in about 50 days after anthesis.

Seeds were extracted by five different methods (1) by crushing with mallet (2) by fermentation (3) by treatment with alkali (4) by treatment with concentrated commercial hydrochloric acid and (5) by pulping in a mechanical pulper. It was found that the seed recovery was maximum in acid treatment method registering five per cent followed by 4.18 per cent in mechanical pulping method, while the seed recovery in alkali, fermentation and crushing methods was 3.94, 3.10 and 3.67 per cent, respectively.

R.1. Seed Tech. 205 Evolving suitable package of practices for quality seed production in Okra (*Abelmoschus esculentus*)
C. Ramalingam

In the variety, Pusa Sawani, influence of population density on the yield of quality seeds was studied with three spacings viz., 20, 30 and 40 cm between plants in the row with a common inter-row spacing of 60 cm during the monsoon season. The crop was raised adopting the recommended package of practices. The matured fruits were harvested in five pickings. The differences between the seed yields due to spacings were significant, and were 525, 441 and 397 kg ha from the plants spaced at 20, 30 and 40 cm, respectively. The increase in yield obtained from plants spaced at 20 cm was 24.4 and 16.0 per cent, respectively of those spaced at 30 and 40 cm. The seeds obtained from the treatments, when size graded using 12/64", 11/64" and 10/64" round perforated sieves separated the lots into three

almost equal quantities thereby indicating that spacing had not influenced the size of the seeds.

Influence of picking of fruits for vegetable on the yield and quality of seed was studied with five treatments viz., allowing all the fruits for seed (T_1), picking the first (T_2), two (T_3), three (T_4) and four fruits (T_5) for vegetable and allowing the rest for seed. The seed yields were 415, 368 317, 217 and 153 kg/ha for the treatments T_1 to T_5, respectively, and the yield differences due to treatments were significant. The percentage of decrease in seed yield was 11.33, 23.61, 34.69 and 63.86, respectively in treatments T_2 to T_5 when compared with that of the control. The result had also indicated that in as much as 95 per cent and more of the total seed yield were obtained within first four pickings, the number of pickings for seed can be restricted to four.

R. 1. Seed Tech. 206 Package of practices for seed production in cucurbits and onion
K. R. Ramaswamy, T. V. Karivaratharaju and C. Ramalingam

Studies conducted with pumpkin revealed that weight of fruits did not bear any relationship with seed weight and total number of matured or immatured seeds. However, small fruits were found to possess small-sized seeds. The 1000 - seed weight varied from 78-153 g. Based on size, the bulk seed could be grouped into four classes viz., extra bold, bold, medium and small. The extra bold seeds exhibited delayed germination but eventually recorded almost 100 per cent germination; in small seeds the generation ranged between 65-75 per cent. In each class, seeds possessing (i) well developed embryo with thin seed coat, (ii) poorly developed embryo with thick seed coat, (iii) well developed embryo with seed coat of normal thickness were found to occur. This type of development of the tissues of the seed posed problem in grading the seeds on weight basis. Under field conditions, size or weight of seed did not exhibit any association with vigour parameters such as leaf area, dry weight, root growth etc., up to a period of 45 days. The size of the working sample for pumpkin, ash-gourd and bottle-gourd seeds has been worked out and the size should be of 370, 190 and 465 g, respectively. Viability studies carried out since October-November, 1975 in pumpkin and ribbed-gourd seeds stored in gada cloth bags under ambient temperature and relative humidity indicated that their seeds maintained their viability at 80-90 per cent at the end of 14 months of storage.

R.1. Seed Tech. 207 Studies on seed production technology in cotton
K. R. Ramaswamy, T. V. Karivaratharaju and K. Nagarajan

The results from viability studies conducted with fuzzy seeds of MCU 5 indicated the superiority of polycoated aluminium foil paper pouches over

gada cloth bag as the best storage container. Studies conducted to determine the optimum period of treating the fuzzy seeds of MCU. 5 with commercial H_2SO_4 for delinting revealed that by prolonging the treatment beyond three minutes, the outer seed coat became weaker, while the inner palisade cells were completely destroyed; the germination also was reduced by 55 per cent with the production of abnormal seedlings up to 45 per cent.

R. 1. Seed Tech. 208 Studies on seed production technology in redgram
V. Ramakrishnan and K. K. Vadivelu

Seeds of Co.2 redgram can be carried over in cloth bags up to 20 months under ambient conditions of temperature and relative humidity prevailing at Coimbatore, provided they are dried to a seed moisture content of eight to nine per cent and slurry treated with captan 75 per cent WDP at 200 g/100kg of seed with 500 ml of water or dusted with any one of the insecticides of plant origin such as nochi (*Vitex negundo*), arapu (*Albizzia amara*), neem (*Azadirachta indica*) and tobacco (*Nicotiana tabacum*) leaf powder or fruit rind powder of poochi kottai (*Sapindus laurifolius*) or soap nut (*Acacia concinna*) mixed at 1 kg/100 kg of seed. The loss in viability and vigour was minimum.

R. 1. Seed Tech. 209 Evolving suitable package of practices for the production of quality seeds in blackgram
C. Dharmalingam and V. Ramakrishnan

In order to recommend the optimum sieve size for grading Co 3 blackgram seed, cleaned seeds were size graded with 10/64", 9/64" and 8/64" round perforated metal sieves. The grades differed significantly in their 100-seed weight, while the germination and vigour of seeds did not show significant differences.

The graded seeds along with the ungraded seeds were tested for their growth characteristics and yield potential in a field trial. The field stand recorded on 10th and 20th day and at harvest and the plant height, number of leaves and pod and seed yield recorded at harvest did not differ significantly due to different grades. However, the recovery of quality seeds from the plants raised with 10/64" and 9/64" retained seeds was 97 per cent as against 85 per cent obtained from the plants from seeds of smaller grade, and the plants came to maturity five days earlier than the ungraded bulk.

Seed development and maturation studies carried out with Co. 3 revealed that pod development commenced in advance of seed development and reached the maximum on the 10th day after fertilization. The development of seed as measured by the rate of increase in fresh weight and volume of the seed and weight of seed coat and cotyledons closely followed pod development. The cotyledons developed rapidly between 15th and 20th day.

The moisture content of seed and shell decreased with seed development. The shell moisture content got reduced much earlier than the seed moisture content which took place between 20 and 25 days after anthesis. Ten day-old seeds were capable of germination to an extent of 29 per cent. A maximum germination of 98 per cent was achieved with 20 day-old seeds and beyond this, the germination was reduced due to the development of hard seeds to an extent of 4 per cent. The study revealed that the blackgram seeds attained physiological maturity in about 20 days after anthesis.

The Co.2 seeds stored in paper aluminiumfoil-polythene (P-AF-P) laminated pouch for 32 months under ambient conditions of temperature and relative humidity with and without seed treatments were tested for their yield potential in row yield trials in comparison with freshly harvested seeds. The results revealed that the effective seed protectant which minimised the loss of viability of seeds over 32 months of storage was also able to conserve the production potential up to 60 per cent, while the seeds without the seed protectant showed not only greater loss in viability but also had reduced production potential of 8 per cent. The significant decrease in the production potential of seeds was mainly due to loss of vigour in storage.

R. 1. Seed Tech. 210 Standardisation of seed production technology in greengram

C. Dharmalingam and V. Ramakrishnan

To study the extent of influence of seasonal conditions on the duration of the crop, seed yield and quality, monthly sowing trial was in progress since March 1976 with Co. 3. The results obtained for the last 10 months indicated that (i) the difference in the duration of the crop varied from three to six days between the months of sowing; (ii) the crop maturing during hot months namely, March and April produced hard seeds to an extent of 35-40 per cent and (iii) those maturing during the cold and humid months namely, December and January contained off-coloured seeds, to an extent of five to ten per cent. The field stand, plant height, number of leaves, seed yield and seed recovery also varied from month to month, the variations being 42-98 per cent, 36.4-41.6 cm, 4.4-7.1, 139-541 kg/ha and 55.8-91.1 per cent, respectively.

The seed development and maturation studies carried out with Co. 3 revealed that (i) the pods reached maximum length (7.6 cm), breadth (0.48 cm) and fresh weight (1.126 g) on the 10th day after anthesis and subsequently the increase was not substantial. The seeds recorded lower values during the corresponding period in respect to seed volume and weight. A rapid increase observed in these values on 15th day suggested that the seeds attained full development after the pod development. The moisture content of the shell decreased to 16.1 per cent when compared to that of the 20 day-old seed (32.2 per cent).

Even 10 day-old seeds were capable of germination to an extent of 45 per cent and maximum germination of 87 per cent was obtained with 20 day-old seeds.

R. 1. Seed Tech. 211 Standardization of seed production technology in bengalgram
K. K. Vadivelu and V. Ramakrishnan

A field trial was conducted with Co 1 variety to determine the requirements of N, P_2O_5 and K_2O and optimum spacing for quality seed production. Three levels in each of N, P_2O_5 and K_2O (0, 10 and 20 kg/ha) alone and in all possible combinations under two spacings (30 x 20 and 30 x 25 cm) were studied. The results indicated that the seed yield differences, as judged by the recovery percentage of quality seeds, due to the application of different levels of fertilizers were significant. A maximum seed yield of 667 kg/ha was recorded in the treatment combination of 20:20:20 of N:P:K kg/ha with a spacing of 30x20 cm which was 13.5 per cent more than that obtained with the treatment viz., 10:10:10 N:P:K kg/ha, the dosage recommended for a grain crop.

Seeds of Co. 1 carried over at 8 per cent seed moisture content in polycoated paper pouches after treating separately with activated clay at 1 kg and with captan 75 per cent WDP at 75 g per 100 kg of seeds, recorded 72 and 74 per cent germination, respectively even after 18 months of storage under ambient temperature and relative humidity.

R. 1. Seed Tech. 212 Standardisation of seed production technology in gingelly
V. Ramakrishnan and C. Dharmalingam

With a view to determine the optimum season for seed production in gingelly TMV. 3, monthly sowing trials were in progress since March 1976. The results obtained so far indicated that a maximum yield of 555.7 kg/ha of graded seeds could be obtained from the sowings of April followed by 400 kg/ha from May sowings.

For getting quality seeds in gingelly TMV. 3, the seed lots can be graded with B. S. S. 14 wiremesh sieve or 4/64" round perforated metal sieve, considering the seed recovery consistent with seed quality.

Seed development and maturation studies carried out with the TMV. 3 revealed that the seeds reached physiological maturity 40 days after anthesis when the seed protein and the germination potential, besides the oil content, were the maximum registering, 21.3, 100 and 46.8 per cent, respectively. At this stage the seed moisture content was only 21.6 per cent.

R. 1. *Seed Tech.* 213 **Studies on seed production technology in sunflower**
K. K. Vadivelu and V. Ramakrishnan

Studies to find out the influence of major nutrients on seed quality and yield in sunflower EC. 68413 were carried out with six combinations of N and P_2O_5 viz., 60:40; 60:60; 80:40; 80:60:10:40 and 100:60 kg/ha with a common dose of 30 kg of K. The results indicated that seed yield differences due to different levels of N and P_2O_5 were significant. Application of 60 kg of N in combination with 60 kg of P_2O_5 gave a maximum seed yield of 783 kg/ha which was 16 per cent more than that (494 kg/ha) obtained from the treatment with 60:40; recommended for a commercial crop.

The seed viability studies carried out since July 1975 revealed that the seed with eight per cent seed moisture content stored in 50/60 GSM paper 0.009" thick aluminium foil-150 gauge polythene laminated pouches lost its viability completely within nine months of storage, whereas when stored in cloth bags it maintained 60 per cent viability up to 12 months under ambient storage conditions. This clearly revealed that if the seeds are to be packed in moisture-vapour proof containers, the seed moisture content should be well below eight per cent.

R. 1. *Seed Tech.* 214 Standardisation of seed production technology in groundnut
C. Dharmalingam and V. Ramakrishnan

POL. 1 groundnut kernels dried to six per cent seed moisture content and stored in open containers like cloth bag, lost 50 and 100 per cent viability within three and nine months of storage, respectively. When the kernels were treated with dry neem leaf powder at 1 kg per 100 kg of kernels and stored in cloth bag, they remained viable to an extent of 75 per cent upto three months. When the kernels were stored in moisture-vapour proof containers like 50/60 GSM paper 0.009" thick aluminium foil-150 gauge polythene laminated pouches a minimum of 70 per cent germination was maintained even after 12 months storage under ambient temperature and relative humidity.

Groundnut varieties TMV. 1 and TMV.10 were tested at fortnightly intervals to determine the period of dormancy. The results indicated that TMV. 1 had a dormancy period up to 100 days, whereas in TMV. 10 it existed even after 150 days and that even after this period only 50 per cent of the seeds germinated without any pre-treatment. Soaking the kernels in 0.5 per cent solution of KNO_3 for 16-24 hours was effective to break the dormancy in these seeds and to enhance the germination of seeds.

R. 1. *Seed Tech.* 215 **Studies on seed production technology in coffee**
V. Ramakrishnan and C. Dharmalingam

Seeds of coffee cultivar Tafaricala and selections 2495, 2044, 2499 and 795 were collected from Kodai Hills on 21.12.76 and sown in sand medium

Even 10 day-old seeds were capable of germination to an extent of 45 per cent and maximum germination of 87 per cent was obtained with 20 day-old seeds.

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with and without parchment on 5.1.77 after hand pulping and pulping separately with concentrated H_2SO_4 and HCl (commercial grade) each at 100ml/kg of berries. The pulped seeds were slurry treated with captan 75 per cent WDP at 2 g/kg of seeds before sowing for assessing their initial viability before storage. One set of trays was placed in a closed germinator maintained at 28 $\pm$ 2°C and 80 per cent RH, while another set was placed in an open cabinet germinator maintained at ambient temperature and RH. Only hand pulped seeds of *Tafaricala* were the earliest to germinate under controlled conditions of 28 $\pm$ 2°C and 80 per cent RH up to 88 per cent in 55-60 days, while those of others were only in 'topee' stage. The germination of hand and acid pulped seeds of all selections including those of Tafaricala was delayed under ambient temperature and relative humidity.

R. 1. Seed Tech. 216 Studies on viability and storage of cardamom seeds
C. Dharmalingam and V. Ramakrishnan

Ripened capsules of Mysore and Vallakayi types collected from 11 and 4 year-old plantations were graded into size grades namely, 26/64", 24/64", 20/64", 18/64" and 16/64" retained. The recovery percentage from the sieves 24/64", 22/64", 20/64" and 16/64" was 12, 20, 32, 25, respectively. Capsule size was found to be positively associated with seed recovery, number and weight of seeds per capsule in both the varieties.

Cardamom seeds take about 30-40 days for germination under field conditions. Pre-treatment with concentrated sulphuric acid for 20 minutes and treating with a fungicide after thorough washing with water was found to hasten the germination by about 15-20 days. Seventy six per cent of the treated seeds germinated within 20 days, while only 12 per cent of them germinated in the control.

R. 1. Seed Tech. 217 Studies on seed viability and storage of black pepper seeds
K. K. Vadivelu and V. Ramakrishnan

Studies conducted with berries of Panniyur-1 collected from the off-season crop revealed that (i) the spike length varied from 11.5 to 18.1 cm; (ii) the number of berries per spike ranged between 80 to 161; and (iii) the 100-berry wet weight varied from 12.2 to 14.1 g. The round perforated sieve of the specification 14/64" was found optimum for grading the fresh matured berries. Treating the fresh ripened berries either with concentrated H_2SO_4 or HCl (commercial grade) at 10 ml for 100 g of berries for less than a minute facilitates the easy removal of the meso-and epicarps, which are usually the sites of infection by the pathogens.

Tests conducted with berries collected at different stages of maturity revealed that berries which were dark red in colour recorded the maximum

germination of 67 per cent followed by those which were light red, yellow and green recording 20, 12 and nil per cent germination, respectively. The germination started only after twenty days and continued up to 2½ months. The viability period of the seed was found to be very short, being only of five to seven days after harvest, even after storing in low temperature of 5°C.

R. I. Seed. Tech. 218 Studies on seed production technology in chillies and sweet pepper
T. V. Karivaratharaju and K. Nagarajan

Fruits of variety K2 chillies collected at 10-day intervals from the date of flowering indicated that the fruit and seed development followed the normal 'S' curve. Seeds collected separately from green, yellow and red fruits recorded 37, 68 and 98 per cent germination, respectively. Studies undertaken with fruit samples collected from fields at Coimbatore, Bhavanisagar and Gobichettipalayam did not exhibit any association between fruit weight and number and weight of seeds per fruit. However, seeds from big sized fruits were of better quality than from small fruits.

Seeds were size graded with round perforated metal sieves and the recovery was 1.70 and 17.5 per cent, respectively for those passed and retained by 6/64" sieve and 49.5 and 31.3 per cent, respectively for those retained by 7/64" and 8/64" sieves. The results indicated that for grading K.2 chilli seeds 7/64" sieve was the optimum one.

The seeds can be further upgraded by using floatation principle in water The 'floaters' comprising of immatures and ill-filled seeds accounted 17.25 per cent. The 'sinkers' produced 95.98 per cent healthy and vigorous seedlings when compared to the 'floaters' which registered 39 per cent. Evaluation using shoot length and root length parameters also indicated the superiority of 'sinkers'. Sinker fraction for ten seedlings produced a seedling weight of 0.59 g, while that of the 'floaters' produced 0.23 g.

Seeds of the grade, 7/64" retained, obtained from red, yellow and green fruits recorded a 1000-seed weight of 5.34, 4.40 and 3.68 g, respectively. Similarly, the immature seeds occurred to the extent of 0.56, 1.60 and 2.44 per cent of the total seed fractions of the red, yellow and green fruits.

R. I. Seed Tech. 219 Studies on seed production technology in paddy
G. Thulasidas and Jacqueline A. Selvaraj

Seeds of Co. 39 paddy with nine per cent seed moisture content were treated separately with phoxim (1:500), captan (4 g/kg), sevin (50 per cent at 1:500), common salt (15:100) and activated clay (1:100). The untreated control and the treated seeds were packed in gunny and polythene bags separately and stored under ambient conditions of temperature and relative humidity in March

1976. They were tested for germination at bimonthly intervals. The germination was maintained in all treatments in both gunny and polythene bags. The moisture percentage estimated at the 9th month of storage varied from 10.5 to 11.6 per cent in all the treatments except in the salt treatment where the moisture was 18.0 per cent in gunny and 15.0 per cent in polythene containers of storage.

For Co. 39, Vaigai and cultures 633, 658 and 6202, 1.8 mm x 12.7 mm or 19.1 mm oblong perforated sieve is recommended for higher recovery of quality seeds, while for Bhavani a sieve with 1.5 mm x 12.7 mm or 19.1 mm oblong perforation is ideal.

FOOD TECHNOLOGY

R. 1. Food Tech. 201 Processing and preservation of fruits and vegetables
R. Sadasivam and A. Susheela Thirumaran

Preparation of guava juice drink from guava juice extracted with pectic enzymes has been standardised. Among the various combinations viz. 15 and 20 per cent juice content, 20° Brix and 0.25, 0.5 and 1.0 per cent acidity, guava juice drink with 15 per cent juice, 20° Brix and 0.25 per cent acidity has been found to be organoleptically good.

R. 1. Food Tech. 203 Evaluation of edible products from mushroom
A. P. Shanthy and A. Susheela Thirumaran

The canning of *Pleurotus* sp. has been standardised. The addition of citric acid at 0.1, 0.25 and 0.5% levels along with 2% brine as filling medium in cans affected the color and flavour of *Pleurotus*. An acidity of 0.25% gives a product light in color with desirable flavour. It has also been found that the addition of acid does not affect the texture of canned *Pleurotus*. Twenty minutes processing at 15 psi is necessary for 1 lb jam can.

R. 1. Food Tech. 209 Preservation and extension of shelf life of shell egg
S. Neelakantan and A. P. Shanthy

The effect of coating the shell eggs with (i) groundnut oil, (ii) refined oil and (iii) an emulsion containing groundnut oil with agrimycin showed, that the treated eggs could be stored at room temperature for weeks in good condition. The decrease in the yolk index, albumen index and percentage thick albumen was the least in emulsion coated eggs followed by groundnut oil coated eggs. The loss of weight during the three week storage period was less than one per cent in the treated eggs.

AGRICULTURAL ECONOMICS

R. 1. Ag. Econ. 202 **Comprehensive Scheme for studying the cost of cultivation of principal crops in Tamil Nadu**

V. Rajagopalan, R. Srinivasan, T. K. Shanmugasundaram, N. Kanakasabapathy, N. Raveendran and C. K. Mohan

Analysis of data on groundnut and sugarcane collected under cost of cultivation of principal crops scheme during 1972-73 and 1973-74 respectively was taken up.

The average yield of groundnut in the state was estimated at 9.28 quintals per hectare. The total cost of production per hectare was Rs. 1102.00 and the average cost of production per quintal worked out to Rs.104.90. Out of this total cost, 61.28 per cent formed the operational cost and 38.72 per cent, the fixed cost. Seeds formed 36 per cent of the operational cost followed by human labour which accounted for 35.32 per cent. Among the fixed costs, rent formed the major component.

The average yield of sugarcane for the state was 781.7 quintals per hectare and the production cost was Rs. 5605.00 The average cost of production per quintal worked to Rs. 7.00. Of the operational cost, human labour, fertilizers and manures formed 34.60 and 19.70 per cent respectively.

In the case of paddy, the estimated yield of paddy during 1973-74 was 23.83 quintals involving an average cost of Rs. 1754.30. The average cost of production per quintal obtained was Rs. 62.33. Among the cost items, the operational cost accounted for 62.21 per cent and fixed cost 37.79 per cent. Human labour constituted 43.58 per cent of the operational cost followed by fertilizers and manures with 21.33 per cent.

R. 1. Ag. Econ. 220 **Study on growth pattern of labour force in Coimbatore taluk**

P. K. Aiyasamy and B. Natarajan

The study covered 100 rural households in four villages. It indicated that there were 160 earners depending on agricultural occupation, out of which 98 earners were fully employed for 101-200 days, 30 for 201-250 days and only 20 of them for over 251 days, the remaining 20 had full employment for less than 100 days. Situational analysis indicated that full employment in agriculture for a larger number of days of 251 and above is occassioned only in cases of (i) farms having fairly assured irrigation facilities and (ii) growing labour intensive commercial crops like irrigated groundnut, cotton, tomato, chillies, flowers and the like. Agricultural labourers are not found to maintain animals since they have no facility for fodder production and purchase of fodder is found uneconomic. However, farmers experiencing dwindling

groundwater are gradually switching over to raising of fodder crops and maintaining one or two milch animals to augment the farm income.

In general, the casual labourer works on an average for eight hours, though the time of commencement, the duration of the session and the intervals between the sessions were found to vary between the villages and even in the same village as among the operations. The nature of operations, the system of hiring and the kind of crops decided the time of commencement of work.

A further analysis on the pattern of mobility indicated that 16 respondents had moved currently to villages from elsewhere. 'Pull' factors like employment opportunities, inducement by relatives and friends and other social factors like marriages, insistence by in-laws were stated to be the reasons for mobility.

Location-specific multiple crop patterns and mixed farming practices would help all categories of farms in generating additional employment opportunities besides augmenting the farm income.

R. 1Ag. Econ. 221 Formulation of optimum farm plans for crop, livestock and other enterprises
A. Kandaswamy and C. Arputharaj

Scientific farm plans for maximising farm income with existing resources were prepared for ten farms in Coimbatore district operated by members of farmers' discussion group of the Farmers' Training Centre, Coimbatore. The alternative plans indicated an increase of nearly 10 per cent in cropping intensity. They indicated that the garden land farms in Coimbatore area were already intensively cultivated with limited scope for crop diversification. However, there existed a vast scope for diversifying farm enterprise-mix by introducing dairy cattle under the constraints of irrigation water. This required an additional investment of Rs. 2600 to Rs.5950 per farm. The optimum plans that included both crop and milk production have offered scope for increasing the farm income upto 33 per cent. Farm Planning as an extension tool if popularised would help farm development.

R. 1. Ag. Econ. 224 Study of demand and supply of vegetables in Coimbatore city
K. Ramamoorthy and V. Subramanian

The study on demand for vegetables in Coimbatore city was undertaken by investigating the consumption standards of vegetables in 200 households which in general, are more favourably placed. It was found that, on an average, 5.5 per cent of the household's income was spent on vegetables. The average consumption of vegetables for this category of families was 322 grams per day and on this criteria the estimated demand for vegetables was

just over 100 tonnes per day. Chinthamani Super Market was found to supply on an average, about 18 per cent of the vegetables on this basis. At an average cost of one rupee per kg the value of vegetables required for Coimbatore city exceeds one lakh rupees per day.

The demand for vegetables showed an increasing trend, while supply fluctuated widely among the kinds of vegetables and over the time span culminating in price distortions benefiting neither the primary producer nor the ultimate consumer. Organising cooperative vegetable marketing and phasing out production strategies to ensure even flow of vegetables in the market, need in-depth studies.

R. 1. Ag. Econ. 225 Economic enquiry into the problems of dairy farming in Coimbatore taluk
K. Ramamoorthy and P. Selvaraj

Investigations on the problems of dairy farming were undertaken in Coimbatore taluk. The sample size consisted of 20 milk cooperatives, 55 urban producers, 30 rural producers and 100 consumers. Besides, two milk markets were also included for the study.

The average milk yield of a cow was 2239 litres in the rural areas and 19[illegible]2 litres in urban centres. The average lactation period was 300 days. The average milk yield of a buffalo was 1637 litres in rural areas during a lactation period of 252 days.

The cost of production of one litre of cow's milk in the case of urban producers works out to Rs. 1.53. Roughages, concentrates and veterinary charges constituted 55.63 per cent, 25.48 per cent and 1.50 per cent of the total cost of production respectively. Total cost of production per litre of cow's milk, in the case of rural producers works out to Re. 0.67 in sorghum-straw tract and Re. 0.81 in sugarcane leaves tract.

The cost of maintenance of a cow in the rural areas was Rs. 1508 and this was nearly double in urban centres reaching a figure of Rs. 3054. In case of buffaloes, the maintenance cost was Rs. 1453 in rural areas. Among the cost components, feeds alone accounted for 75 per cent in the case of cows and 81 per cent in the case of buffaloes in the rural areas, while this was nearly the same in urban centres in terms of percentage, though the absolute cost was nearly double.

The two conventional markets functioning at Chidambaram Park and Syrian Church Road were studied for six months from July, 1975 to December, 1975. Nearly 8000 litres of skimmed milk arrived daily from the nearby taluks. The average wholesale and retail prices of skimmed milk were Rs. 0.97 and Rs. 1.07 respectively. The maximum retail price of whole milk during the periods of scarcity coinciding with marriage seasons was Rs.4.50 per litre and

that of skimmed milk was Rs. 2.00 per litre. More often this happened during the first week of September. The minimum price was Rs. 1.60 and 0.55 for whole milk and skimmed milk respectively during November - December. Strengthening the base of the milk cooperatives and regulating private trade would help to ensure quality milk at reasonable prices.

R. 1 Ag. Eocn. 232 An economic appraisal of land development bank finance in Kancheepuram taluk, Tamil Nadu State
S. A. Radhakrishnan

A study of 200 farms revealed that out of all the investments made with the help of bank finance, the returns from minor irrigation investments were the highest. Further, the return is higher in big farms than in small farms, because the former can make full use of the resources developed through the investments, while the latter could not do so. This suggests encouragement of irrigation cooperatives with common ownership of water resources and individual management of the farm. The main source of incremental income for tractor investment is from Custom Service. If the scope for Custom Service is limited, tractor investments could result in negative returns.

The project for conversion of drylands into garden lands needs to be supplemented by projects for reclamation which includes, levelling, bunding and laying field channels so that the water use efficiency could be improved.

The multiperiod programming model developed to estimate the growth of the farms indicated that if the farmers invest their surplus income in their farms for improving the water conveyance systems, development of the land by reclamation and in acquiring equipments, there is great scope for further development. Such investments apart from increasing the income, augment employment opportunities for agricultural labour.

R. 1. Ag. Econ. 233 Increasing income, production and employment in Cauvery Basin
S. Krishnamoorthy

A study on increasing income, production and employment was undertaken in the region comprising Thanjavur, Orathanadu, Mannargudi and Pattukkotai taluks. The sample consisted of 210 farms located in nine important soil series covering 96 per cent of the cultivated areas.

The results indicated that by reorganising the existing levels of resources, the income could be increased with varying degrees, the increase in income being highest in Madukkur soils and lowest in Vallam soil series. Under the improved resource situation, substantial increase in income could be generated in Mudukulam, Budalur and Vallam soil series.

On examination of the labour use pattern, it was found that the employment opportunities for labour increased to the maximum of 59.7 per cent under existing resource level and 128.0 per cent under improved resource situation.

The income of the region would increase by 23.34 per cent under the existing resource level and by 66.59 per cent under improved resource level. The optimum plans indicated the scope for increasing the area under sugarcane, groundnut, pulses, maize, gingelly, cotton, coconut, mulberry, grapes, etc. in the region. The optimum solution reveals the existence of surplus groundwater resource due to smaller operational area. Irrigation cooperatives supported by water management counselling will help in this process. Ensuring accessibitity for adequate capital would help agricultural intensification in the region. The overall trend shows paucity of labour during peak seasons of planting and harvesting of rice crop. The process of selective mechanisation is desired. Net value product of crops indicated the scope for location specific rice varieties in increasing output and it would therefore be necessary to strengthen the research efforts in this direction. Crop diversification in the region requires building new and/or strengthening of the existing markets for both products and factors along with a sound price policy.

R. 1. Ag. Econ. 236 Operational Research Project for rural development in Dharmapuri District
V. Rajagopalan, S. Rajakutty and R. Pannirselvam

The Operational Research Project for rural development in Dharmapuri district had its focus on studying the nature of the existing resource base and structure, the identification of bottlenecks and exploring the possibilities for alternate system of farming to increase income, production and employment.

The study revealed that the size of the holdings in the five selected villages of Dharmapuri District namely Charbathy, Bannihalli, Jagadab, Karadihalli and Kumbarahalli, are predominantly small. In the sample villages, 48.23 per cent of the holdings were less than five acres, and 32.18 per cent of the holdings being five to ten acres. Of the cultivated area, 59.29 per cent was under dry land, 21.08 per cent under garden land and 7.95 per cent under wet land. Plantations and topes occupied 11.68 per cent of the area.

The study brought to light that 82 per cent of the rural credit was supplied by the private agencies, while the cooperatives, commercial banks and the Government provided one per cent, 13 per cent and two per cent respectively.

Under the current level of production practices, the adoption of innovations indicated widely varying levels as between the various crops and farmer groups. It was observed that, in case of paddy 75 per cent of the

farmers were using improved varieties, but in respect of millets and oil seeds coverage was practically negligible. Similarly fertilizer use was, much less than the recommended dosage and that too in fewer farms. An income analysis of some chosen farms indicated that without much of resource reallocation, introduction of high yielding varieties of paddy, tomato and ragi and raising mixed crop of groundnut offer scope for output increases. Multiple cropping practices in areas of assured irrigation and mixed farming with two or three dairy animals can substantially increase income levels. The organisational support for adequate and timely financial support needs no emphasis.

R. 1. Ag. Econ. 240 Study on water resource management in gardenland agriculture
A. Kandaswamy and S. Devarajan

An investigation on water resource was undertaken with a view to estimate cost of irrigation for major crops and to identify the variables that influence the cost structure of irrigation. In Coimbatore taluk, ninety six farms in 12 villages were randomly selected. The selected farms were post stratified into two groups. The first group consisted of wells whose depth was upto 100.6 feet and the second group exceeding this depth. The H.P of electric motor used for lifting water ranged from 5.0 H.P. to 17.5 H.P. Total cost (variable plus fixed cost) for one irrigation (5 ha cm) varied from Rs. 60.80 to Rs.241.45. A situational analysis indicated that the depth of wells was the major determining factor of the cost of irrigation. Cost function and total revenue function were fitted to find the optimum depth of wells in the region. The optimum depth of wells was arrived through the equality of marginal cost and marginal returns. This showed that the depth of well upto 132.55 feet was economically optimum and deepening beyond this depth was not advisable under existing factor and product prices.

An optimum farm plan to maximise farm income arrived through programming indicated inclusion of less water consuming crops like cotton, ragi maize, cholam etc. and diversification of enterprises by including livestock. The need for water policy and enlightened water management approach seems inevitable under the existing situations in garden land area of Coimbatore taluk where indiscriminate pumping of groundwater resources have come to cause serious damage to the rural economy.

R. 1. Ag. Econ. 234 Employment earnings and levels of living of landless agricultural labour households
V. Rajagopalan and N. Raveendran

One hundred and fifty randomly selected labour households in Annur Block of Coimbatore District constituted the sample. The avarage family size of a labour household varied from 3.5 to 7.9. The number of

days employed per year for the earners ranged from 176 to 206 days. The mean annual income per worker ranged from Rs. 720 to Rs. 814 with a sample mean of 741. But the mean per capita income was Rs. 460 to Rs 520 with an average of Rs. 475. The mean per capita expenditure was Rs. 582. The extent of employment in non-agricultural sector was very meagre and non-agricultural income constituted only 1.6 per cent of the total income. The opportunities for increasing employment potential for the labour households primarily depend upon stabilizing agricultural development by providing increased irrigation facilities by the efficient use of surface flows and groundwater resources. Increased cropping intensities with multi-crop mix will help in increasing employment.

R. 2. Ag. Econ. 203 Studies on the problems of small farmers with respect to production and marketing
V. S. Narasimhan and S. Kombairaju

The study was taken up in 120 selected holdings distributed in 20 villages in East and West Panchayat Unions of Madurai. Out of 120 only 56 are owner cultivators cultivating a total area of 80 hectares, 39 are owner cum tenants cultivating 60 hectares and tenants constitute 25 numbers cultivating 33 hectares. Regarding cropping, it was found that out of 173 hectares cultivated by all farmers 47.84 per cent only (83 ha) is double crop area. Considering the fragmentation of holdings it was found that out of 120 holdings only one holding was compact, 43 holdings having two fragments, 58 holdings having three fragments, 17 holdings having four fragments and one holding to the extent of five fragments.

The intensity of cropping appears to be more in owner cultivation being 154.54 and is followed by owner cum tenants with 148.81 and tenants with 142.28. Paddy occupies almost the entire area of the 120 holdings and out of the total cropped area, high yielding varieties occupy 61 per cent in the owner farms. 49 per cent in the owner-cum-tenant farms and 44 per cent in the tenant farms.

Regarding credit, a number of farmers borrow privately and pay interest in kind of paddy at the rate of 360 kg per Rs. 1000 which works out to nearly 36 per cent.

It is also found that wherever double cropping is adopted mostly high yielding varieties are grown-a short duration crop in the I season followed by a medium duration variety in the II season.

If some supplementary irrigation source is developed, the practice of double cropping could be extended to the single crop area also.

*R. 19. Ag. Econ.*201 Economics of rice production in rice farming system in Pondicherry region
V. Selvan

To find out the economics of rice production in Pondicherry region the trial was conducted in one hectare land with optimum inputs and improved practices. Three crop rotations in rice farming system are being followed viz, rice-rice-rice; rice-rice-groundnut and rice-rice-ragi. The cost of cultivation of paddy for one hectare worked to Rs. 3,303.82 when variable cost alone was considered. When indirect or fixed cost was included the cost accounts to Rs. 4,163.82 The cost of producing of one kilogram of paddy was 0.55 with variable cost and 0.69 with fixed cost. The cost-benefit ratio worked out to 1.00 : 1.87 when variable cost alone was considered. The ratio worked to 1.00 : 1.45 when fixed cost was included. With the varietywise estimation, there was practically no difference in cost of cultivation.

R. 23. Ag. Econ. 201 Scheme for farm management research for planning agricultural development in the hills of Tamil Nadu
V. Balakrishnan, N. Puttuswamy, L. P. Swaminathan, V. Puhazhendhi and R. Pannirselvam

Under this I.C.A.R. Scheme five villages have been selected in each panchayat union viz., Coonoor, Kotagiri, Ootacamund and Gudalur in Nilgiris District. In each village five farmers have been selected at random. Apart from this another five farmers with model situation were also selected for comparison.

AGRICULTURAL EXTENSION

R. 1. Ag. Extn. 203 A study on the factors influencing farmers in the adoption of new crop varieties and their practices
V. S. Subramanyan and K. B. Sripaul

In this study to find out the adoption behaviour between garden land and dryland farmers, it was found that the percentage of garden land farmers who had not used hybrid varieties of cholam, seed treatment practices, plant protection chemicals and balanced manuring inspite of their knowledge about them were 59.3, 26.2, 18.0 and 33.3 respectively and for dryland farmers, the related percentages were 96.2, 46.2, 66.2 and 92.7 respectively. The dryland farmers had not followed the recommended practices for cholam owing to unpredictable monsoon (76.3%), lack of adequate and thorough understanding of the practices (40.1%), being unprepared for taking risks (18.8%), tendency to follow the non-adopting neighbours and friends (16.8%), inefficiency of the practices to meet the felt need of farmers (11%), lack of economic feasibility (10.5%) and lack of initiative and interest (9.3%).

R. 1. Ag. Extn. 208 **Study of the peripatetic training programme in Coimbatore District**
A. John Knight and K. Lakshmanan

In the study to find out the impact of peripatetic demonstrations on farmers, it was found that 63 per cent of farmers had gained high knowledge and 90 per cent had acquired high degree of skill from the demonstration on delinting of cotton seed with sulphuric acid. From the second demonstration on spraying of planofix to check flower drop, 75 per cent gained high knowledge and 51 per cent acquired high degree of skill. The adopters in respect of the above two demonstrations accounted for 39 and 65.2 per cent respectively. The main reason for low adoption in the former case was non-availability of sulphuric acid at village level. Farmers with large holdings, high educational status and young or middle aged acquired a little more knowledge from both the demonstrations compared to their counterparts with small holdings, low educational status and old age. The demonstrations were reported to have been properly conducted. Farmers understood the demonsation topics easily and found them useful.

R. 1. Ag. Extn. 214 Factors responsible for the poor interest and poor participation by the Panchayat Leaders towards agricultural production programmes
A. John Knight and R. Annamalai

The reasons for low interest in agricultural production programmes as stated by the Presidents were: achievement in agriculture could not be shown in physical form for their election campaign (69.2%), plans were prepared elsewhere (67.2%); preparation of plans was not known, so no interest was evinced (61.16%); all plans were implemented by extension workers (47.79%) inputs were not made available in time (47.34%) and mass involvement was required (42.92%). The reasons attributed for poor participation were: Agriculture being an occupation, the improvement of it depended on the participation of all the farmers in the area (42.92%) and the inputs supplied were not available in time (47.4%). From the view point of extension workers, the reasons for Presidents do not consider themselves as leaders of people (77.52%); administrators expect the block staff to prepare the plans for the village programmes (77.5%); and they concentrate more on non-agricultural programmes only (68.91%).

R. 1. Ag. Extn. 218 Differential influence of extension methods used by extension personnel of sugar factories and State Department of Agriculture among the registered and non-registered cane growers
R. Annamalai and E. V. Kalamegam

The study revealed that 93.3 per cent of Sugar Factory Extension staff

and 63.33 per cent State Department Extension staff used individual contact method like farm and home visit and office calls. The mass media was used by 29.17 and 39.17 percentage of extension personnel of State Department of Agriculture and sugar factory respectively. The frequency of contact with cane growers by the staff of sugar factory ranged from 10 to 20 days and for the staff of State Department, it was 30 to 75. Among registered cane growers, cent per cent had adopted seed treatment practice, 55.83%, recommended fertilizer dose and 45.83% plant protection measures and in the case of non-registered cane growers the corresponding percentages were 63.33, 48.33 and 26.67 respectively.

R. 2. Ag. Extn. 206 Impact of 'Ulavar Thunaivan' Journal
M. Muthiah and S. Somasundaram

The study revealed that more than 80 per cent of farmers became aware of the improved agricultural practices such as seed treatment, plant disease control, fertilizer application, application of herbicides and use of bacterial culture. 91 per cent of the farmer readers opined that the journal is helpful not only to know about the research findings but also helped to adopt improved practices. Among the adopters 63 per cent adopted the practices without consulting other sources and 37 per cent after consulting other sources.

R. 2. Ag. Extn. 207 Influence of extension methods
G. Perumal

The individual contact method like farm and home visit was mostly used by the Extension Personnel of Sugar Factories (93.3 per cent) and the State Department Extension Personnel (63.3 per cent) to influence the farmers to adopt more number of practices in sugarcane cultivation. The adoption of practices due to the influence of extension methods was more among the registered cane growers (46 to 100 per cent) than the non-registered cane growers (27 to 63 per cent). Due to the large jurisdication and relatively less transport facilities available the frequency of contact with the cane growers was found to be comparatively less by State Department Extension personnel.

SOIL AND WATER CONSERVATION

R. 1. S & WC. 202 Water requirements and management of paddy crops
R. K. Sivanappan and D. Palanisamy

Experiments conducted on TKM. 6 and Co. 36 varieties indicated that the early stress and middle stress treatments entailed considerable reduction in the yield whereas the reduction was less for late stress case. Hence, one may go in for the late stress mode of irrigation if the acuteness of water scarcity warrants so.

R. 1. S & WC. 219 Studies on seepage using different lining materials for storing water in the farm pond
R. K. Sivanappan and B. Saravanabhavan

Studies on seepage using different lining materials showed that minimum seepage loss (0.86 cm/day/m²) occurred in soil cement, 3.5" thick (4 soil : 4 sand : 1 cement) as against 2.56, 1.83 and 1.37 cm/day/m² in black alkathene, soil cement (1") and white alkathene respectively.

R. 1. S & WC. 203 Estimation of water requirements for rice, ragi and groundnut in relation to their growth phases
R. Karunanithi

The water requirement of long duration rice variety, Co.40 (Rajarajan) of 165 days maturity in terms of frequency of irrigation in relation to growth phases viz. vegetative and reproductive was estimated. The results indicated that overall highest yield was obtained with irrigation once in two days both in vegetative and reproductive phases (6406 kg/ha). However, considering the fact that the entire vegetative phase, falls in the monsoon season of high intensity rain and also economy in water use and efficiency, the treatment of irrigation once in five days during vegetative phase and once in two days during reproductive phase appeared better without affecting the productivity (6478 kg/ha).

In ragi the study has brought out that irrigating once in 11 days in juvenile and flowering phase and once in 15 days during maturity phase registered high yields by recording 3096 kg grain per hectare.

In groundnut the study has indicated that irrigating the crop once in 15 days at juvenile and peg and pod formation phases and once in 18 days at flowering phase gave highest yield of 2082 kg of pods/ha. The next best alternative appeared to be irrigating at intervals 15, 12 and 15 days or 15, 15 and 12 days at juvenile, flowering and peg and pod formation phase respectively as the yields recorded by these treatments are same (1957 kg of pods/ha).

FARM MACHINERY

R. 1. Fm. Mach. 217 Tapping energy for agricultural utilisation
K. R. Swaminathan, C. Sriram and S. Dhandapani

Gobar gas plant : The TNAU mobile gobar gas plant has been used as a dual fuel burner.

(i) The flame has been found quite suitable for solder smelting also. (ii) Storing of this gas has been tried and the gas has been stored in a container upto a pressure of 8 atm. (iii) A simple and cheap bit has been designed which can be fitted to the existing stationary diesel fuel engines to enable the substitution of a part of the diesel fuel with biogas.

Load test on a 5 Hp diesel engine (i) with diesel alone and (ii) in dual fuel has revealed that by running in dual fuel there is a saving ranging from 38 to 42 paise per hour of running the engine.

Solar Plate Collector : A solar plate collector for heating water (for taking bath for a large family of 9 members) has been designed and fabricated. Trials conducted with this arrangement during normal sunny days have shown that by allowing water from inlet tank at 1 lit/min from 11 a.m. to 2 p.m, 180 litres of water of about 78°C is collected from the outlet of the collector. This water is collected and stored in the outlet tank and used the next day for taking bath, when the temperature was found to be around 63°C.

Neglecting the energy spent on raising the water to the inlet tank, the energy obtained is, heating 180 litres of water from 30 C to 63 C is equivalent to 8.1 k.w.h. The approximate cost of the unit with said accessories is Rs. 4,500/-.

R. 1. Fm. Mach. 225 Development and testing of paddy harvester
C. R. Shanmugham, A. Shanmugam and N. Balasubramanian

The developed harvester is a front mounted attachment to the Mitshibushi power tiller. The harvester consists of a cutter bar for harvesting, a reel and conveyor for windrowing the cut crop in such a way as to facilitate easy collection by human labour. The power from the power tiller is taken from the clutch pulley to main shaft from where it is transmitted to the different working parts.

The power tiller front mounted harvester can be used where there is scarcity of labour during harvesting season. In the large sized plot, this unit can be more effectively used with greater advantage and economy. Where paddy is non-lodging and non-shedding, the efficiency of the machine is quite distinct. The only pre-requisite is to hand harvest about 4 m x 1 m area at a corner of the field, to accommodate the unit before starting the machine harvesting. The turning radius of the unit is as low as 1.5 m. So it can be used in plots as small as 6 metres wide without difficulty.

The harvester can cover 0.7 ha/day of 8 hours. The shedding of grains is less than 1%. The cost of harvesting one hectare by the machine including manual collection of the cut crop is Rs. 110/- and with manual labour it will cost Rs. 140/- to harvest the same resulting in a saving of Rs. 30/- or 21.5%.

AGRICULTURAL PROCESSING

R. 1. Ag. Proc. 206 Development of a ventafloor drier with hot air generator and air ducts
C. R. Shanmugam and V. V. Sreenarayanan

A mobile hot air generator for blowing hot air at the desired temperature by burning kerosene for paddy, groundnuts and millets has been developed for, (i) drying crops in ventilatad bins in batches or in storage drying, (ii) drying in sacks, inside or outside the buildings, (iii) drying crops loose in the open or under cover and (iv) drying unthreshed paddy in ear heads.

The cost of this equipment is Rs. 19,000/- Three to four tonnes of paddy can be dried at a time. The cost of drying one tonne of paddy from 22 to 12% moisture content in 8 hours' duration is Rs. 40/-

R. 1. Ag. Proc. 210 Development of a Petkus cleaner
V. V. Sreenarayanan and M. Ramanathan

A seed cleaner cum grader based on the Petkus model has been developed. This unit is intended for cleaning and grading the seeds and for upgrading their quality, by removing the foreign particles in the seed lot. The cost of this machine is Rs. 12,000/- and the outturn is 200 kg of cleaned seed per hour. The cost of cleaning and grading is Rs 275 per quintal of seeds.

R. 1. Ag. Proc. 214 Fixing up optimum stage of harvest for groundnut
K. V. Selvaraj

The experiments conducted during summer 1976 to find out optimum stages of harvest of groundnut using POL. 2 and TMV. 7 varieties revealed that the variety POL. 2 harvest on 104th day after sowing recorded maximum yield of 2472 kg of dry pod per hectare, when compared to the harvests on 98, 101, 107 and 110 day. In the case of TMV. 7, the crop harvested on 98th day recorded higher yield of 2518 kg of dry pods per hectare.

R. 1. Ag. Proc. 226 Effect of different stripping and shelling methods on store pests of groundnut
K. Asaf Ali and A. Dakshinamoorthy

The extent of insect pest infestation in two varieties of groundnut TMV.2 and TMV. 10 by shelling with hand operated decorticator and hand stripping were compared. After a period of five months the pest infestation in the kernels obtained by hand stripping was less (35.75%) compared to the decorticator shelled kernels (58.28%).

R. 1. Ag. Proc. 228 **Studies on the effect of plant products and inert materials on the control of store pests of groundnut**
K. Asaf Ali and A. Dakshinamoorthy

Dust formulation of various plant products and inert materials viz., neem kernel, neem leaf, pyrethrum, pungam, activated clay and tricalcium phosphate were mixed with groundnut pods in the ratio of 1 : 100 and kept in storage to assess their effecf in preventing the store pest intestation. After a storage period of nine months it was observed that the mean percentage of infestation in the treatment with activated clay was less (6.50%) compared to control (19.43%) and other treatments.

R. 1. Ag. Proc. 229 Chemical control of store pests of groundnut
A. Asaf Ali and A. Dakshinamoorthy

Groundnut pods were stored in the gunny bags impregnated with different chemicals viz. dursban, formothian, phoxim, lebaycid and endosulphan at the rate of 1000 mg. a.i./m^2. After a storage period of nine months, it was observed that the mean percentage of infestation by pests was low in lebaycid (7.32%) compared to control (10.62%).

AGRICULTURAL STRUCTURES

R. 1. Ag. St. 202 Development of chemical toilet
K. R. Karai Gowder and J. Jayakumar

A chemical toilet of 140 litres capacity was developed and its functioning found to be efficient. The pH and BOD values of the sludge in the chemical toilet were tested and found that pH 7.3 to 8.2 and BOD 4000-2000 ppm respectively. It was noticed no corrosive or scale formation inside the toilet.

R. 1. Ag. St. 203 Evolving economical conveyance and the distribution structures
P. Natarajan and J. Jayakumar

A soil cement channel of ratio (0.5 cement, 0.5 soil and 3.0 sand) was fabricated and found that ultimate strength was reasonable and cost per metre length Rs. 6.50 and less compared to other types of channel.

R. 1. Ag. St. 204 Design and development of poultry equipment
P. Natarajan and J. Jayakumar

A 10 kg capacity G. I. feeder was developed based on angle of repose of the feed and functional efficiency found to be good. The cost is Rs. 45/-. To reduce the cost of feeder, a bamboo feeder lined with polythene sheet was developed costing Rs. 14/- only.

BIOLOGY

R. 1. Biol. 102 Evolving virus-free material with the aid of tissue culture technique
C. Padmanabhan and G. Pathmanabhan

Two tomato varieties (*Lycopersicon esculentum* var. Co. 1 and Co. 2) were grown by meristem tip culture. The meristem tips (apical dome with two leaf primordia) regenerated into normal plantlets (40-60%) when cultured on a modified Murashige and Skoog medium (containing macro and micro elements of MS and vitamins according to Camborg) supplemented with napthalene acetic acid (NAA 0.19 mg/1), adenine (0.11 mg/1) ferric EDTA (5 ml/l), coconut milk (15% v/v) at 26°C, 60% relative humidity and exposed to fluorescent light (3200 lux, photoperiod 10 hrs.)

To regenerate plants free from Cassava Mosaic the apical meristems of three cultivars of cassava (*Manihot esculents* Crantz. var. 'Malavella', H. 165 and Co. 1 were grown in different culture media using different levels of growth promoters. The culture tubes inoculated with single apical meristems were placed in a growth chamber maintained at 26° ± 2° C under cool white fluorescent light (3200 lux using a light and dark cycle of 8/16 hr/day. In a modified medium of Murashige and Skoog supplemented with benzyladenine (0.19 mg/l) and NAA (0.19 mg/l) 42% of the meristems regenerated and formed small shoots in 8-12 days. However, there was no root regeneration. Benzyladenine had a better synergistic effect with NAA than kinetin in stimulating shoot regeneration in cassava.

In different species and hybrids of banana tried, the anthers showed some initial stage of development, then they became dark in colour and slowly dried up without forming any plantlet. Here the pollen grains after 15-20 days of inoculation increased in size, then they elongated and became multinucleated. This stage resembled the free nucleate stage of the endosperm in the zygotic embryos. The growth of the pollen grains were arrested at this stage of development. The experiments are under progress to see the role of host extract in inducing development of plantlet.

R. 1. Biol. 201 Silkworm rearing and silk productivity by utilising different varieties of mulberry
N. V. Radha and S. Letchoumanane

Rearing of M 4, M 5, M 6 and M 7 generations of silkworm was completed.

In M 4 generation the cocoon weight ranged from 0.820 g to 1.670 g among the mutants (35 lines) when compared to that of control being 1.064 g. The percentage of shell ranged from 7.8 to 20.2 among the mutants while in

control it was 13.8. The filament length ranged from 408 M to 830 M in the mutants and in the control it was 620 M.

In M 5 generation the cocoon weight ranged from 0.926 to 1.526 g while in control it was 1 420 g. The shell percentage varied from 10.4 to 20.8 while in control it was 14.0. The filament length ranged from 431 M to 898 M among the mutants. In control it was 731 M.

In M 6 generation the cocoon weight ranged from 0.960 g to 1.420 g while in control it was 1.000 g. The percentage of shell ranged from 12.2 to 20.8 whereas in the control it was 15.1. The filament length ranged from 619.6 M to 818 M in mutants while in control it was 650 M. In this M 6 generation sexual dimorphism among the moths was also noted in the line No. L3LBA. In this the abdomen of the male was ash coloured whereas in the female it was cream coloured.

In the hybrid (Mutant cross) the cocoon weight was 1.300 g; shell percentage was 18; and the filament length was 800 M. In the nonhyberated *mutant the cocoon weight was 1.600 g; shell percentage was 16 and the* filament length was 918.5 M.

In M 7 generation the cocoon weight ranged from 1.100 g to 1.540 g among the mutants whereas in control it was 1.206 g. The shell percentage ranged from 9.48 to 17.1 among the mutants and in control it was 8.96. The filament length ranged from 628 M to 901 M among the mutants whereas in control it was 782 M. The renditta ranged from 6.21 to 10.93 among the mutants whereas in control it was 10.05.

In the hybrid UH. 1 the cocoon weight was 1.306 g, shell percentage was 12.4; filament length was 789 M and renditta was 7.694. In the hybrid UH. 2 the cocoon weight was 1.82; shell percentage was 15.17; filament length was 794 M and renditta was 6.594.

R. 1. Biol. 202 Studies on the ecology of honey bees

N.V. Radha and Rajeswari Sundarababu

The visit of honey bees to sunflower crop under different environmental conditions was observed in Eastern Block; Millets Breeding Station and New Area (MBS) in various seasons. The frequency of honey bee visit to the first two fields was more (80.8 to 137.3) where there was no spraying whereas in plots surrounded by crops receiving pesticide application the frequency of visit was poor(78.4).

Honey bees from different locations were collected and identified as *Aphis cerana indica*.

To find out the pollen carrying capacity of honey bees during different months the pollen pellets from the legs of honey bees were collected and weighed. It ranged from 2.2 to 4.0 mg during the month of December 1976.

R. 1. Biol. 203 Development, multiplication and supply of *Rhizobium* cultures for various leguminous crops grown in Tamil Nadu
G. Oblisami and K. Balaraman

The field trial carried out at the Regional Research Station, Tindivanam to find out the effect of molybdenum on the nodulation and yield of groundnut (Ah.8254) indicated that the application of molybdenum (200 ppm) along with *rhizobium* as seed treatment increased the number of nodules and dry matter production over the control.

In vitro study on the possibilities of replacing mannitol with other carbon sources like sucrose, glucose, sorbitol etc. has indicated that sorbitol and sucrose could eliminate the use of mannitol for the growth of rhizobium on large scale.

Effect of various concentrations of different vitamins to the growth medium indicated that creatin and ascorbic acid induced better growth of rhizobium from groundnut. Creatin at 20 ppm concentration induced better growth and ascorbic acid at 40 ppm level. Maximum growth of the organism was recorded at 12 hours after inoculation whereas in the control it was reached at about 72 hours after inoculation.

R. 1. Biol. 204 Studies on the microbial decomposition of organic matter in soil
D. Purushothaman and N. Dhanapal

At different depths of a compost pit the micro-organisms involved in the decomposition of organic matter were studied. The temperature of the top layer of the compost pit was 22°C and at five feet depth it recorded 58°C. In general, more number of fungi, bacteria, actinomycetes, *Azotobacter* and *Arthrobacter* were present on the top layers (0-1') of the pit and as the depth increased, the microbial load decreased. At five feet depth the relative proportion of microorganisms decreased. The population of *Azotobacter* was absent beneath one foot layer. In all these different layers of pit, the predominant fungal species were *Aspergillus, Humicola, Fusarium, Penicillium* and *Trichoderma*. Gram-positive spore forming rods were the predominant bacterial flora. *Streptomycetes* sp. were found in all these layers. The study on the survival of *Azotobacter* on organic residues revealed that, *A. chroococcum*, when inoculated on to the plant residues like sugarcane bagasse, maize, cumbu and paddy straw, and compost indicated that, it can survive upto three months in these residues both under sterile and unsterile conditions.

The study on the decomposition of plant residues like tapioca, cotton, papaya and redgram leaves indicated the participation of microbial enzymes like cellulase, B-glucosidase, amylase, invertase, phosphatase and dextranase. The enzyme dextranase, decomposing the polysaccharides of microorganisms in soil was determined in soil samples obtained from different sources like Tindivanam, Pollachi, Ooty, and Coimbatore.

R. 1. Biol. 202 Study of environmental pollution on plant systems
G. Oblisami, C. Padmanabhan and G. Pathmanabhan

The cement dust pollution on groundnut crop near Puliyur indicated that the quantity of dust deposit was 0.6 mg/m^2 of the leaf surface. Leaf area index and relative growth rate were found to be reduced in cement dust deposited groundnut plants when compared to non-polluted plants. Weight of the root nodules was significantly reduced in polluted groundnut plants over the control. The number of nodules were 100 to 125/plant in polluted plant while in non-polluted plant it was 200 to 270 plant. The pod yield was affected considerably in polluted fields.

Studies on the cotton crop in the vicinity of the cement factory indicated that the height of plants were smaller in polluted fields than non-polluted fields. Number of leaves and number of bolls per plant were lower in polluted fields. The cement dust deposition on tomato crop ranged from 468 to 1121 mg/plant/day.

The effect of Trichy Distillery effluents on the seed germination, shoot and root growth in different plants like paddy, maize, cholam, greengram and tomato indicated that the shoot growth was drastically inhibited in greengram, cholam, maize and paddy. The germination of tomato seeds was completely inhibited by the effluent.

R. 1. Biol. 210 Utilization of effluents from sago factories for growing microorganisms
D. Purushothaman and N. Dhanapal

The sago effluent water when used for irrigation, inhibited the growth of root and shoot of blackgram, groundnut, peas, sunflower, beans, paddy, cholam and maize because of very low pH (pH 3.0 to 3.5). The soil irrigated turned dark brown and emitted H_2S smell.

The heterofermentative process brought about by different groups of microorganisms as fungi, bacteria, and few actinomycetes and protozoa ultimately resulted in different organic acids. The longer the water stored in tank the more the microbial load enumerated.

The chemical analysis of the water revealed the presence of 0.15% fermentable carbohydrate, traces of nitrogen and other minerals as P, Ca,

K, Cu, Fe, Mn and Mg. In addition, it contained organic acids and certain indole and skatole derivatives.

Chlorine, in the form of bleaching powder when employed to treat effluent as deoderant, was effective at 100-150 ppm (2.5-3 kg/tank of 1000 litres capacity)

Irrigation of chlorinated sago effluent water increased the height of paddy, sunflower, cholam, tomato and blackgram.

R. 1. Biol. 212 Studies on the microbial (*Azotobacter*) activities in rice soils
D. Purushothaman and N. Dhanapal

A field trial to establish the effect of *Azotobacter* inoculant in combination with different levels of fertilizer nitrogen, viz. 100 per cent, 75 per cent, 50 per cent, 25 per cent of the recommended dose at Regional Research Station, Kaveripatnam indicated that at all levels of nitrogen tested *Azotobacter* inoculation increased the grain yield; with 75 per cent of the fertilizer nitrogen and *Azotobacter* inoculation, the grain and straw yield were on par with the yields obtained with 100 per cent of fertiliser nitrogen application indicating thereby the possibility of reducing 25 per cent of fertilizer nitrogen. The field trial at the wetlands, Tamil Nadu Agricultural University, Coimbatore in which organic matter in the form of paddy straw was incorporated at the rate of five t/ha revealed a highly significant yield increase of both grain and straw due to *Azotobacter* inoculation. The grain yield obtained with 75 per cent of recommended dose of N-fertilizer + *Azotobacter* was on par with the treatment receiving 100 per cent nitrogen alone indicating a saving of 25 per cent of the recommended dose of nitrogen.

Studies made on the efficiency of *Azotobacter* isolates obtained from the rhizosphere of rice and other C_3 plants like cotton indicated that the cultures obtained from the rhizosphere of certain C_4 plant species like *Amaranthus viridis* L., *Brachiaria mutica* L., *Cyperus rotundus* L., etc. were more efficient fixers of nitrogen.

R. 1. Biol. 213 Studies on the effect of *Azotobacter* on various crops grown under different agro-climatic conditions
G. Oblisami and P. Santhanakrishnan

The field trial on the effect of *Azotobacter chrococcum* in combination with *Bacillus polymyxa* and *B. megatherium* on Co. 40 (Rajarajan) variety of paddy at Paddy Breeding Station indicated that all the three inoculants with 100 kg fertilizer N gave the maximum grain yield (7190 kg/ha), where as the treatment receiving 160 kg fertilizer N alone gave 6595 kg/ha.

A field trial on the effect of *Azotobacter* and *B. polymyxa* on Co.21 (Uch. V.1) variety of cholam at Agricultural Research Station, Bhavanisagar has indicated that *Azotobacter* plus 67.5 kg N/ha of fertilizer and *Azotobacter* plus *B. polymyxa* along with 90 kg N/ha gave the maximum grain yield of 3820 kg/ha and 3965 kg/ha, respectively which were higher over that of 90 kg fertilizer alone (3765 kg/ha).

The field trial on the effect of *Azotobacter* and *Beijerinckia* along with four levels of fertilizer N on potato (Kufri Jothi variety) at Ooty has indicated that both the inoculants gave higher yield of potato tubers (12250 to 18562 kg/ha) when compared to that of treatment with cent per cent fertilizer alone (11,330 kg/ha).

The performance of *Azotobacter* and *B. polymyxa* on RP-4-14 variety of rice in the farmer's holding at Singampettai indicated that *Azotobacter* and *B. polymyxa* along with 62.5 per cent of fertilizer nitrogen gave higher yield of grain (7250 kg/ha) over the control with cent per cent of fertilizer nitrogen (6435 kg/ha).

The effect of *Azotobacter* on Co. 1 variety of tapioca in a field trial indicated that maximum tuber yield of 39 t/ha was recorded in the treatment receiving *Azotobacter* and 50 kg N/ha when compared to the control with 50 kg N/ha fertilizer alone giving 28.2 t/ha.

R. 1. Biol. 217 Studies on interaction between the rhizobia and pesticides applied to seed and soil
G. Oblisami and K. Balaraman

Field trials were carried out in Agricultural Research Station, Bhavanisagar to study the effect of interaction between pesticides and different strains of *Rhizobium* in relation to various leguminous crops. *Rhizobium* strains from redgram produced better nodulation and increased plant weight in Co.2 redgram when solvirex was applied.

The rhizobial strains (Cc.1, Pm.1, Pa.1 and Ah.6) gave better nodulation and higher grain yields of greengram and redgram in association with solvirex and furadan. They performed better in association with fungicides like agallol, ceresan and captan in groundnut by increasing the nodulation and pod yield.

A field trial with Co.3 greengram to know the interaction between insecticides and *Rhizobium* indicated that *Rhizobium* sp. induced better nodulation and grain yield in combination with furadan, aldicarb, endrin, solvirex and thimet (2401, 2225, 2130, 1998 and 1986 kg/ha, respectively). Higher grain yield was obtained at half the recommended doses of thimet, solvirex and aldicarb and at normal recommended doses with endrin, lindane and furadan.

R. I. Biol 218 **Investigations on the interrelationships between rhizobia and forage legumes in relation to efficient nitrogen fixation and transfer to associated fodder grasses**
G. Oblisami, K. Balaraman, and P. Santhanakrishnan

The exudation pattern from the germinating seeds of lucerne indicated more quantity of flavonoids whereas the exudates from the germinating cowpea seeds contained more quantity of phenols and orthodihydroxy phenols. Maximum quantity of these compounds was exuded at 6 and 18 hours after incubation by lucerne and cowpea, respectively.

A field trial to study the effect of *Rhizobium* on lupine on nitrogen fixation and transfer to companion crop, oats (Borinova variety) was conducted at Ooty. Inoculation of lupine seeds with rhizobia enhanced the number of nodules and fodder yield of lupine by 30 and 15 per cent, respectively when compared with control. The fodder yield of oats was increased due to its association with uninoculated lupine (73 t/ha) over the control, oats alone (49 t/ha). But, when the lupine was inoculated with rhizobia the yield of oats was increased further (85 t/ha).

R. I. Biol. 219 Studies on the microbiology of *idli* and *dosai* fermentation and development of new improved products
D. Purushothaman and N. Dhanapal

In order to obtain the natural microorganisms involved in the fermentation, the fermented batters were obtained from several hotels of Coimbatore, Erode and Virudhunagar and considerable variation in the microbial population of the different sources was observed. *Lactobacillus acidophilus, Leuconostoc mesenteroides* and yeast were recorded in the batters. The home made batters carry a denser microbial population (*Lactobacillus*, yeast, *Leuconostoc* than the hotel made batters; the batters recording a pH of 3.8-3.9 are considered to be good enough for *idli* and *dosai* making.

The rice variety 'White Kar' is best suited for quality *idli* and *dosai* making. Varieties like Kannaki, Jaya, Karuna and Krishna are also found suitable. The varieties IR.8, IR.20, IR.22 and Pennai are poorest.

R. I. Biol. 220 Isolation and development of efficient cultures of *Rhizobium* for various pulse crops
A. Balasubramanian and T. Natarajan

Several rhizobial cultures were isolated from various pulse crops from different places of Tamil Nadu and were screened in the laboratory for their nodulation efficiency and a number of isolates having better efficiency were obtained. Comparative efficiency trials, under field conditions, along with several other efficient cultures obtained from elsewhere in India

and abroad indicated that the nodulation efficiency of the rhizobial cultures differed with the crop variety and location. In case of greengram, for Co.3 variety, AH. 6 and Bangalore culture were better (yield increase up to 183.3%) and for M.2 variety, Bangalore and NG cultures were better (18.5% increase). With regard to blackgram PM.1 culture was more suitable (58.9% increase) for Co.3 variety and for M3 variety, BMB-P47 (Coimbatore) and PM.1 and Bangalore cultures were better (82.5% increased yield). In case of cowpea, AH.6 was suitable (261.7%) for Co.2 variety and for PLS.370 variety VS.1 and CMBS.1 were better (53.8% increase).

R. 1. Biol. 221 Screening of germplasm collection of the different pulses for nodulation characteristics
A. Balasubramanian and T. Natarajan

Out of the 104 greengram, 85 blackgram, 377 redgram, 35 bengalgram and 47 horsegram genotypes screened, the following were found to be efficient nodulators under Coimbatore conditions.

Greengram : P1MS.2, T.44, K.851, M.140, 256/2, 372/1, 86/1, LM.220, Mutant 2 and Hissar Nos. 30,33 and 45.
Blackgram : Co.1-10/6, BES.1-1, Musiri BP-3, CO.1-1-40/9 and BNU.165-1
Redgram : P.1186, P.1193, P.665, 15-3-3, 1258, NP.15, 585, PLS.347/3 and Arahar 14B.
Bengalgram : CPS.2, 850-3-27 and JG.897
Horsegram : T.45, PLS.229, Bellary 1668, Cuddalore local

R. 1. Biol. 223 Survival of *Rhizobium* strains in different soils
A. Balasubramanian, S. Jayachandran and J. Prabhakaran

Two antibiotic resistant *Rhizobium* mutants (Str^r and CMP^r) were developed from the wild strain (AH. 6) by nitrosoguanidine treatment. They tolerated a maximum concentration of 1000 ppm streptomycin and chloramphenicol, respectively. Both the mutants exhibited low endogenous respiration compared in the wild strain. The Str^r mutant recorded more biomass and more water soluble and alkali stable polysaccharides compared with wild type while the CAM^r was less stable in its growth characteristics. Nodulation studies in pot culture indicated that the mean number of nodules formed by Str^r mutant was less than that of the wild strain (8.33 and 14.33 per plant, respectively). The Str^r mutant could be reisolated from the inoculated plant nodules.

R. 1. Biol. 224 Studies on certain microbiological aspects of fishes grown in sewage-fed ponds
P. Rajasekaran, P. Nagarajan, and K. Venkataramanujam

Representative water samples from sewage-fed ponds and fresh-water

ponds wherein fishes grown were collected and analysed for microflora. The results obtained indicated that the total, coliform and foecal streptococcal counts were more in the water samples collected from sewage-fed ponds as compared to those of fresh-water ponds.

The samples from the gut, muscle (or flesh) and skin from the fish varieties such as rohu and fimbriatus grown in sewage-fed ponds were screened selectively for the presence of pathogens like *Shigella* *Salmonella* and *Escherichia*. *Shigella*-like organisms were isolated from the muscle and gut of rohu and gut of fimbriatus. *Aerobacter* and *Klebsiella* like organisms were also isolated from the gut and muscle of rohu and *Proteus* sp from the muscle of fimbriatus. *Salmonella* were absent in the samples. Serological confirmations of various species of *Shigella* are being worked out.

R. 2. Biol. 209 Nematode parasites of flower plants in Madurai region
R. Janarthanan and V. N Muralidharan

In the pathogenicity experiment on tuberose with the root knot nematode (*Meloidogyne incognita*) it was found that the nematode at 5000 per plant caused significant reduction in plant growth resulting in loss in yield of flowers quantitatively and also qualitatively. The nematode infection also caused death of a few plants.

R. 2. Biol. 212 Studies on the isolation and screening of *Rhizobium* strains and testing the efficient strains on different varieties of pulses
M. Rangarajan and P. Muthukrishnan

Application of composite culture of *Rhizobium* consisting of the isolates of IARI-E. 9, Coimbatore EMBS-P. 47, Bangalore, Jabalpur, Madurai-Mash 64 and Nitrobac (from Biocultures) significantly increased the nodulation and yield in Co. 2, G. 104 and H. 21-40-14 varieties of blackgram. While the control and various isolates applied singly gave yields ranging from 8.16 to 10.58 q/ha, the composite culture gave 11.16 q/ha in Co. 2 variety, thus recording an increased yield ranging from 10.2 to 40.4% over other isolates of *Rhizobium* and control. Similar trend was observed with the use of composite culture in other two varieties although they recorded less yield than Co. 2.

In case of greengram, application of composite culture consisting of the isolates of IARI-D-10, Coimbatore GMBS-1, Bangalore, Jabalpur, Madurai PLS-287 and Nitrobac gave 8.06 q/ha in Co.2 variety, which is 11.5% to 54.1% more than those of other isolates when applied alone and control that gave 7.23 and 5.23 q/ha, respectively. Similar increased yield was obtained with the use of composite culture in S.8 and ML. 24 varieties of greengram although they recorded lower yields than Co.2.

R. 2. Biol. 214 Interaction between plant protection chemicals and the legume rhizobia symbiosis
M. Rangarajan and P. Muthukrishnan

The soil application of granular insecticides such as disyston and phorate at the recommended level viz., 0.6 kg a.i./ha along with the seed treatment of *Rhizobium* gave 14.70 and 14.20 q/ha, respectively in Co.2 variety of blackgram while the *Rhizobium* treatment alone gave 9.82 q/ha and disyston and phorate alone gave 8.62 and 8.04 q/ha, respectively.

Soil application of aldicarb and furadan at the recommended levels along with the seed treatment of *Rhizobium* also gave similar increased yields over the application of insecticides or bacterial culture alone, although they recorded lower yields than disyston and phorate. The observations on the total number of nodules per plant also indicated that all the four granular insecticides along with *Rhizobium*, were stimulatory to nodulation. Therefore it is found that soil applications of disyston, phorate, aldicarb and furadan along with seed treatment of *Rhizobium*, exert synergistic effect on nodulation and yield in Co. 2 variety of blackgram.

BIOCHEMISTRY

R. 1. Biochem. 103 Biochemical genetic studies of *Azotobacter* and *Rhizobium* with special reference to transformation
S. Sadasivam and P. Thenammai

Intra species transformation was tried between the streptomycin mutant of *Rhizobium* sp. and its wild strain. The transformation frequency was found to range between 0.007 and 0.02 per cent.

R. 1. Biochem. 201 Biochemical aspects of food grains in relation to protein content and their nutritive value
M. Jayaprakasam and S. Pandian

The total and soluble protein contents of the mutants of three rice varieties TKM. 6, Co. 32 and Co. 33 were determined and the results were communicated to the breeder. The mutants Co.33-84 and Co.33-93 were found to have higher protein content than the parent variety Co. 33. Biological value, digestibility and net protein utilisation of TNAU. 658 when evaluated by rat feeding experiment weref ound to be 88.4%, 84.0% and 74.6%, respectively.

R. 1. Biochem. 202 Assessment of the nutritive value of the South Indian diet
R. Sadasivam and S. Leelavathi

The biochemical evaluation of the quality of the diet supplied in IV year B. Sc. (Ag.) students' hostel mess and the Engineering College hostel mess

was carried out on the basis of compound meal analysis. The biochemical evaluation showed slight deficiency of total calorific value in both the messes. Deficiency of vitamins A and B_1 in IV year mess and vitamins B_1 and C in Engineering College mess diet was also noticed. Suitable suggestions like inclusion of green leafy vegetables and fruits in the menu to rectify the nutrient deficiency were given to the hostel authorities.

R. 1. Biochem. 204 Nutritive value of feeds and fodders with special reference to devising cheap poultry and animal feed substitutes
D. Raj and S. Leelavathi

As excess of tannin has an adverse effect on the poultry birds, analyses of tannin content of wild legumes were carried out. *Peltoforum ferrugenum* had the highest quantities of tannins (3.5 g %) whereas *Samania saman* had the lowest (1.0 g %).

Feeding experiments with the cheap poultry feed already formulated in Kovilpatti were conducted on poultry birds. The cheap poultry feed was comparable to control feed in efficiency upto 50% substitution.

R. 1. Biochem. 205 Biochemical studies on the nitrogen fixation of *Pleurotus sajor-caju* (Fr) Singer
B. Thayumanavan and S. Pandian

Various bedding materials such as straw, paper, maize cobs, maize flower sheath, wood shavings and bhendi wastes were used for growing *Pleurotus*. The stage of maximum nitrogen addition through mycelium varied with the bedding materials. Nitrogen addition was observed even after 40th day of inoculation in the case of paper and wood shavings and the stage of maximum nitrogen addition was observed at 20th day in the case of maize flower sheath and straw, the N level remaining constant till 40 days.

The examination of the nitrogen balance data showed that *P. sajor-caju* has a considerable ability to fix atmospheric nitrogen, fixing 582 g of total nitrogen/100 kg dry weight of paper.

PHYSICAL SCIENCES

R. 1. Phy. Sci. 201 Biometrical genetics of crops
C. Suyambulingam and W. Jebarani

187 varieties of cotton were taken for the study. Observations were made on yield, ginning percentage, mean halow-length, lint index and seed index. Correlation study reveals that there is highly significant correlation between the ginning percentage and mean halow-length,

ginning percentage with lint index, mean halow length with seed index and lint index with seed index. Based on this the study on the identification of factors contributing both directly and indirectly towards the yield was carried out. It is found that the ginning percentage alone contributes directly to the yield.

R. 1. Phy. Sci. 202 Utilisation of multivariate techniques in yield component analysis for choosing parental combination in hybridisation programmes for yield improvement in sorghum

Meera Krishnamurthy and C. Kailasam

536 varieties of germplasm collection of sorghum were taken up. Observations were made on the following biometric characters of plant height at maturity: number of leaves, 4th leaf's length, 4th leaf's breadth, peduncle thickness, panicle length and yield. The path analysis was carried out. It was observed that peduncle thickness contributes more towards the yield.

R. 1. Phy. Sci. 203 Effect of plant growth on structure of soils

S. Parthasarathy, N. Arunachalam and K. P. Rajendran alias Anantharaj

The rhizosphere soil samples from the fields grown with paddy variety Karuna, with different nitrogen levels and *Azotobacter* by the National Demonstration Scheme, Madurai, were obtained. They were analysed for their single value constants. The *Azotobacter* along with nitrogenous fertilizers as treatment improved the porespace and waterholding capacity of the soil when compared to the nitrogenous fertilizers alone.

Co. 2 greengram (*Phaseolus aureus* Roxb.) was grown in a red sandy loam soil with the recommended doses of fertilizers as basal treatment. The rhizosphere soil samples were collected at the vegetative, flowering and grain filling stages of the crop. The soils were analysed for their physical properties. The waterholding capacity, porespace, aggregate stability and hydraulic conductivity were more in the cropped soil than control. The specific gravity and apparent density were less for cropped soil. The flowering stage followed by grain filling stage induced improvements in the said lines. The waterholding capacity and percentage porespace had significant positive correlation.

R. 1. Phy. Sci. 204 Studies on the physical aspects of plant and plant surfaces and how the deposition of dust and other pollutants affect the plants

S. Parthasarathy, K. P. Rajendran alias Anantharaj and N. Arunachalam

The spent wash from Trichy Distillery, a water pollutant, reduced the pH of soil and increased its electrical conductivity. The spent wash added-soil

showed a reduction in water holding capacity and porespace after incubation with the pollutant upto 45 days. The aggregate stability of the soil, though it increased up to 15 days of incubation got reduced on 30th and 45th days.

The physical properties of the soils around the Madukkarai Cement Factory, polluted with dust deposition, were examined periodically every month, at four different distances from the stack. The dust deposited fields showed a reduction in waterholding capacity and percentage porespace. Though the pH did not vary much, EC of the soils increased at 0.25 and 0.5 km from the stack.

R. 1. Phy. Sci. 206 Studies on the industrial wastes and their utilisation
C. K. Rajagopal and P. Singaram

The black clay loam soil having pH 9.5 collected from Dindigul, was incubated with the industrial waste matti containing 57.6 per cent sulphur and gypsum at the rate of one, two and three tonnes per acre and leached with rain water periodically to study the exchangeable sodium content. In general more sodium was leached out with the gypsum treated soil than with matti treated. Up to 2 tonnes per acre rate of application, the treatments gypsum and matti behaved similarly. At 4 tonnes per acre rate of application gypsum was superior to matti in leaching out sodium ions.

The Modakkurichi alkali soil having pH 10.0 treated with industrial waste matti and gypsum was incubated and the soil analysed periodically at 30 days interval for EC, pH, soluble salts + exchangeable bases, Ca, Mg K and Na. In the initial days of incubation the availability of exchangeable Na was more and with time the availability decreased. Reduction in EC and pH also was observed.

In another incubation study, the industrial effluents obtained from Sakthi Sugars Mills, Appakkudal, Trichy Distilleries and Pallipalayam Paper Mills were separately mixed in a Coimbatore red soil at the rate of 25,50 and 100 ml and the micro-organism *Trichoderma viride* introduced into it. The progressive change in available nutrients, EC and pH were then measured at 30 days' intervals. It was found that the soluble+exchangeable nutrients were comparatively more in the treatment in which the sugar mill effluent was added, the next being the treatment in which effluent from Trichy Distillery was added and the last being the treatmnet in which the effluent from the Pallipalayam Paper Mill was added.

R. 1. Phy. Sci. 207 Standardisation of extraction and estimation of essential oil from flowers
M. Indira Raja and L. Devarajan

Edward rose (*Rose bourboriana*) flower petals were extracted with redistilled hexane. The yield of 'concrete' was 0.17 per cent of the flower

weight. The 'absolute' was obtained from 'concrete' by distillation of the alcohol extract after filtering off the insoluble waxes at 18°C. The yield of 'absolute' was 0.074 per cent of the weight of flower petals and 43 per cent of the weight of 'concrete'. The 'absolute' was sent to Hindustan Lever Limited, Bombay and the GLC analysis of the 'absolute' as reported by them as follows:-

Geraniol	11 %
Citronellol	4 %
Phenyl ethyl alcohol	56 %
Others	29 %

Divi divi flowers were extracted with petroleum ether. A sweet smelling, 'concrete' was obtained. The yield of 'concrete' was 0.328 per cent of the flower weight.

Maruvu (*Oreganum*) leaves were extracted with petroleum ether. The 'concrete' obtained was a yellowish brown waxy mass with the strong odour of the leaves. The yield of 'concrete' was 0.32 per cent of the weight of leaves. Another portion of the maruvu leaves was extracted by steam distillation method and the extract had the strong odour of the leaves.

Davanum (*Artemesia*) leaves obtained from the market were extracted using petroleum ether. The yield of 'concrete' ranged from 0.2 to 0.24 per cent of the weight of leaves. The 'concrete' possessed the strong odour of the leaves.

Two samples of fruit husks of lavender (*Bursera penicillata*) from the Forest College, were extracted using petroleum ether. The oil content of the samples were 5.43 and 6.36 per cent.

R. 1. Phy. Sci. 208 Study of the chemical composition and structure of fatty oils

M. Indira Raja and L. Devarajan

The pure oils were extracted from corn, safflower and soybean seeds by ether extraction. The oils were analysed for acid value, saponification value, R. M. value, Polenske value and iodine number. Corn oil is found to be high in acid value as compared to the other oils. Safflower oil contains more unsaturated fatty acids, followed by soybean oil, whereas corn oil contains the minimum unsaturated fatty acids among the three oils as indicated by the iodine number. The R. M. value is more for corn oil showing a higher proportion of lower molecular weight fatty acids in its composition.

R. 1. Phy. Sci. 211 **Studies on the absorption spectra of chlorophyll as influenced by herbicides and effect on photosynthesis**
S. Parthasarathy, K. P. Rajendran alias Anantharaj and N. Arunachalam

The leaf samples of bhendi and brinjal crops sprayed with insecticides, (a) methyl parathion, (b) fenitrothion, (c) phosalone, (d) ekalux, and (e) quinolphos were collected 6 hours and 7 days after spraying. The chlorophylls extracted in acetone from the leaves were estimated. In bhendi (a) phosalone, (b) quinolphos and (c) fenitrothion increased the chlorophyll content 6 hours after spraying and on 7th day the values were equal to unsprayed control. Methyl parathion initially did not bring about any change whereas there was an increase on 7th day. In brinjal all the compounds brought about an initial increase in chlorophyll content and the values were equal to that of control on 7th day.

R. 1. Phy. Sci. 212 Effect of industrial effluents on soil properties
D. Raj and N. Kamalam

In order to find out the adverse effect of industrial pollution (viz. tannery effluent) on the physico-chemical and biological properties, tannery effluents were collected from the industrial tannery at Dindigul and analysed for their components. Soil samples from the normal agricultural land as well as from the field where the tannery waste water seep through or used for irrigation were also collected and analysed.

Analysis of tannery waste effluent indicates the presence of considerable amounts of bicarbonates, sulphates and chlorides of magnesium and sodium which are harmful to plant growth. The effluent has high amount of chemical oxygen demand (COD) and biological oxygen demand (BOD) which are the pollutants of major concern containing biologically degradable organic matter and are harmful for aquatic life if let into the water courses.

The results indicate that as a result of impounding the waste effluent from the tannery on the cultivable land, the salts and other toxic substances, from the effluent soak through the soil, adversely affect the composition of the soil and the condition for plant growth. With respect to biological properties, bacterial population as well as fungal population is higher in the tannery effluent than in normal soils. Further, polluted soil contains higher fungal population than the normal soils.

R. 1. Phy. Sci. 214 Biometrical studies in sesamum
M. Murugesan and A. Arokiaraj

Biometric observations on 30 varieties of sesamum on yield per plant, capsule length, capsule breadth, capsule thickness, number of days to first

There has also been a change in the attitude towards family planning, intercaste marriages, status of women, political democracy and space exploration. About 69% of the respondents belonged to unitary family. There was a rise in marriage age of male (27 years) and female (21 years). The families spent liberally on rituals and about 14% of them have had some social participation or other. 19% of them purchased dailies and 6% of the families purchased weeklies.

R. 1. Soc. Sci. 207 Social technology; a study of effect of land-ceiling regulations on farming system
N. Ravindran

Pilot study carried out in Erode Block reveals the difficulties experienced by small and medium farmers in getting supply of agricultural inputs. The farmers report that price of paddy seeds quoted by government agencies is higher. Late discharge of water in Kalingarayan canal is believed to be responsible for higher incidence of pests in paddy. Lack of co-ordination between department of agriculture and public works department in the matter of water supply and irrigation is also reported by the farmers. There is no consultation with farmers in regard to quantum of water required and the time of discharge of water. Regarding credit, procedures followed by Nationalised Banks are reported to be causing certain difficulties to the farmers; farmer not having title to the land could not raise loan, for the land belongs to the joint family as a whole; tenant farmer could not avail of agricultural loan from Nationalised Banks without a certificate from land lord regarding the tenancy. Agricultural loan from co-operatives with its system of compulsory purchase of inputs, whether actually required or not by the farmer is said to be causing loss to farmers.

Further study to know the change in crop production, mechanisation of agriculture with a view to suggesting institutional correctives/new institution building is on.

R. 2. Soc. Sci. 204 A study of social factors influencing food habits among rural, semi-urban and urban people
S. Subramanian

A study has been undertaken to find out social factors influencing food habits among semi-urban people. Vedapatti, a suburb of Coimbatore is selected for the study. One hundred respondents were interviewed. The literacy level of the village is 60.5%. Most of the working people (46.9%) are involved in agriculture. Nearly 13% of the working population are working as mill workers. Others are doing business and working as teachers, mechanics, etc. Out of the 100 respondents, 22 families buy readymade food occasionally for their children and for a change from their routine food habits.

Due to high price of rice, five families have changed from traditional food habit of taking rice to wheat, ragi and cholam. Forty four families are using ragi, twenty five families are using cholam and two families are using *bajra* (cumbu). Most of these families are using minor millets not because of the high nutritive value of the minor millets but because of their poor economic condition. Pork is not acceptable for eight families on religious grounds. Beef and fish are also not acceptable for five families and nine families respectively on religious grounds. Others have mentioned that they are taking or avoiding certain foods because of their regular food habits.

Neighbours, relatives and friends are more powerful sources of information about new types of food and cooking. Out of hundred families interviewed, four of them are not taking any food for their breakfast, six of them are not taking lunch and one family is not taking supper. This is because of their poor economic conditions.

LANGUAGES - ENGLISH

R. 1. Eng. 202 The treatment of message in communication
R. Sudarsanam

Language features that contribute to successful communication for extension education have been identified in relation to specific factors like the audience, stage of felt-need, communication form, etc. On this basis, schedules for editing technical information for successful communication by popular media like the print and radio have been prepared. Model leaflets, bulletins, etc. have also been prepared. The material has been put in the form of a book and offered as a full course (Agricultural Education 403) to the final year students of B. Sc. (Ag.) in collaboration with the Department of Agricultural Extension Education.

R. 1. Eng. 203 A continuous study of the developing competency (quantified) in English of the students of B. Sc. (Ag.), B. E. (Ag.) and B. Sc. (Hort.) from the first year to last year of their course in relation to their socio-economic educational backgrounds
R. Sudarsanam *and* B. Ponnuswamy

By means of an entry test, it has been found that about 65 students (30%) admitted into the first year are very poor in English. Of them 18 have studied P. U. C. in Tamil medium. It was necessary that they were brought up to certain basic level of proficiency in English, as, otherwise, their performance in other science subjects will be highly affected, English being the medium of instruction. Suitable dialogues have been prepared, and regular practice in speaking and listening has been given to them in addition to regular lessons.

The backward students have registered a significant improvement at the end of the I Trimester. This communicative approach may well be followed at all levels with great teaching learning benefits.

R. 1. Eng. 204 A comprehensive study of the linguistic treatment of message in oral and written communication in Tamil by scientists by AIR, TV and print for purposes of extension education and formal education

R. Sudarsanam and B. Kumaravadivelu

It has been found that lectures given in FTC contain a large number of proverbs. The density of proverbs and the presence of proverbs which contradict one another at different levels of abstraction make the communicatees fail to perceive the direction and purpose of the communication, and do not help them remember key messages. The communicators have to be careful in selecting and organising proverbs in relation to communication needs, and without subconsciously entrenching the listeners further in 'superstition'.

It has also been found that perception level is 50% in the first 20 minutes, which drops down to 22% in the subsequent 20 minutes. It is advisable to alternate FTC lectures between oral teaching of a lecturette for 20 minutes and a discussion for 20 minutes.

Analysis of farm broadcasts has revealed that straight talks do not succeed (perception level 20%) owing to (i) the presence of a large number of technical words and (ii) lack of programming of information in relation to the 'decoding path' by which the listeners and readers follow a talk or a written matter meaningfully. Even programmes like 'Question and Answer' broadcast by the radio failed owing to (i) the use of technical words instead of local or dialectal words, (ii) failure to topicalise the important message and (iii) failure to relate the message (in describing a process) cogently in terms of simple and easily identifiable logical relationships. The findings have been suitably incorporated in the booklet prepared under R. 1. Eng. 202. Based on these findings, an experimental study on Psycholinguistic editing for AIR broadcast of a 'straight talk' has been undertaken by a postgraduate student in Agricultural Extension Education.

LANGUAGES - TAMIL

R. 1. Tam. 201 Agricultural practices and insights as revealed in Sangam literature

L. S. Kandasamy

The literature revealed that it was the responsibility of the king to make necessary facilities regarding land and water, the basic needs of the farming

community while the farmers had to produce not only in the interest of their own but in the interest of the country. This research work is in the stage of nearing completion.

R. 2. Tam. 203 A sociolinguistic study of the dialectal variations, folk songs and proverbs in Tamil unique of the farming communities of Madurai district
S Javaraj Nathaniel

The dialect of the farming communities of Madurai is peculiar. It is different from that of Coimbatore and Salem districts. In Tamil 'O' ending words are very few. The farming community in Madurai make O/ > /U/ in their pronunciation of the loan word/kilo/ > kilavu/. For banana bunchy top they say/ sada novu/or sadai novu/. Big farmers are called as/mutalali/. Node and eatable portions of sugarcane are called as/mull/, savalam/respectively. Folk songs are vanishing gradually. Proverbs are still having their holds.

FISHERY SCIENCE

R. 1. Fish. 201 Utility of sewage effluents in fish culture and its economics
V. Natarajan and K. Venkataramanujam

Of the four fish ponds (20 m x 6.5 m x 1 m) experimented under sewage-fed fish culture, two ponds adjacent to the oxidation pond received the oxidized effluent directly and showed enhanced production over the other two. The pond with the full complement of seven species gave a production as high as 109.75 kg i.e. 8,442 kg/ha/ year. Another pond excluding catla, common carp and milk fish realised a production of 4,287 kg ha/ year. The other two ponds which received much diluted effluents through the first row of ponds showed distinctly lower production viz. 3,342 kg and 3,000 kg/ha/year. The difference in production was conspicuously reflected in the growth of fishes.

The gross production from all the ponds combined works out to nearly 250 kg/0.05 ha. The annual revenue would be Rs. 1,000/- at the rate of Rs. 4/- per kg of fish. On the expenditure side, the cost of construction of fish ponds including the two oxidation ponds was Rs. 6,500/-which is a non-recurring initial investment. The recurring cost amounts to Rs. 200/- per annum. The enterprise would be remunerative and rewarding in the years to come. With a flow system, instead of dilution, higher production could be obtained, yielding increased returns.

R. 1. Fish. 203 Survival, growth and production from carp hatchlings
V. Natarajan and K. Venkataramanujam

Fish production in two ponds of 180 m^2 with two fertilization treatments was tested. One pond with a stocking density of 5,000/ha and

species ratio of silver carp-11.1%, catla-28%, mrigal-16.6%, common carp-11.1%, L. *fimbriatus*-16.6%, milk fish 11.1% and grass carp-5.5% under R. C. D. + single superphosphate fertilization yielded 2,400 kg/ha/year. Another pond having the same density and ratio, but fertilized with single superphosphate + potash only gave a production of 1,944 kg/ha/year. A third pond of the same size with a density of 7,277/ha, comprising eight species in the ratio of catla-19.1%, mrigal-11.5%, L. *fimbriatus*-11.5%, rohu-22.9%, grass carp-14.5%, silver carp-5.3%, common carp-7.6%, and no fertilization, excepting that caused incidentally through seepage from the adjacent fertilized ponds. The performance in terms of growth was better in the following order: silver carp, grass carp, mrigal, common carp, rohu, catla, L. *fimbriatus* and milk fish and in terms of survival: catla, mrigal, L. *fimbriatus*, common carp, rohu, grass carp, silver carp and milk fish.

R. 1. Fish. 213 Preparation of fish feed with agricultural and animal products and wastes and feeding trials on carps and catfishes
P. Jeyachandran and Samuel Paulraj

Water stable fish feed pellets were prepared by grinding different feed materials like silkworm pupae, fish meal, groundnut oil cake, rice bran, to a fine powder and mixing with wheat flour or tapioca flour. The wheat flour or tapioca flour was added at 10% of the total ingredients. The feed materials were cooked under 15 lb steam pressure and extruded in the form of pellets with the help of a meat mincer. The pellets were then dried. The conversion ratios obtained with common carp as test fish for five different pellets were 9.5, 11.6, 8.0, 6.8 and 7.4 respectively. Wild leguminous seeds were tested as feed for common carp and *Delonyx regia* and *Gliricidia* gave conversion ratios of 9.7 and 9.6, respectively.

R. 1. Fish. 215 The effects of pollutants on freshwater fishes
M. N. Kutty, P. Jeyachandran and Samuel Paulraj

The effect of three organophosphorus agrochemicals lebaycid, phosvel and zolone on carp (*Cyprinus carpio*) and tilapia fingerlings was studied. It was found that zolone is the most toxic, lebaycid the next and phosvel the least toxic among the three to both the variety of fishes. Carp is more tolerant to zolone than tilapia but tilapia is more tolerant than carp for both lebaycid and phosvel. The 20 ppm solution of lebaycid loses 50% of its strength in 64 hours and 10 ppm solution of zolone comes down to 1.6 ppm in 144 hours (7 days) as evident from bioassay studies.

R. 1. Fish. 216 Culture and breeding of fresh water Prawns
V. Ramachandra Menon and G. Sanjeeviraj

Ninety prawns, *Macrobrachium malcolmsonii* collected from the Cauvery river were reared in large outdoor plastic pools in the University campus.

Their size range was 107-130 mm and weight range 60-160 g. They were fed on chopped fish. Periodically, some female prawns attained maturity as seen by the formation of berries on the under side of their bodies. Such berried females were segregated into well-aerated aquarium tanks containing filtered water. Segregated adult prawns kept in glass aquaria also bred under controlled conditions. The prawns released live young ones from the eggs after incubation for 17-18 days and the tiny larvae were available in large numbers from each brood. Larval food was provided for them in the form of filtered plankton, unicellular algae and other minute organisms. The larvae survived only upto 40 days probably owing to their inability to get over their specificity in larval food.

Juvenile prawns weighing 125 mg have also been collected from the same source and are being reared in plastic pools and earthen ponds as a part of composite fish culture system and their growth rate and conversion are being studied.

R. 1. Fish. 217 Culture of murrels
M.N. Kutty and G. Sanjeeviraj

The murrel, *Channa striatus*, fingerlings grew from an initial weight (0.28 g. mean weight) and length (1.6 cm) to 3.6 g. and 6.5 cm in 161 days; the fish were fed with trash fish and occasionally with beef liver. Mortality in young fingerlings caused by a disease, which showed loss of balance and whirling as symptoms, was controlled by the addition of terramycin powder in the mashed liver fed to the fish. There was also cannibalism among the fish. The growth rate of murrel appears small, but there is a group of large fry (shooting fry) which stood out in size. The largest fish showed a growth of 11 g. (from 0.7 to 11.7 g) during the same period (161 days).

Food preference of murrels was studied feeding them with live forage fish, namely tilapia (*T. mossambica*) and common carp (*Cyprinus carpio*). From 50% predation time (PT_{50} i.e. time taken for three murrels (120, 172 and 188 g) to prey on food fish given, it was found that murrels prefer soft finned common carp to spiny finned tilapia. The 50% predation time was found to be 1.75 hours for carp and 4.6 hours of tilapia. The food conversion of the same three murrels fed with a mixture of tilapia and carp was found to be 12.3 and with tilapia alone was found to be 7.5. It appears that murrels can be cultured using the prolifically breeding tilapia and common carp. Murrels can also be used in polyculture for reducing the unwanted new broods of common carp, often occurring in fish ponds, and also for eradicating trash fish such as tilapia and minnows from culture ponds.

R. 19. Fish. 210 Composite fish culture
V. Sundararaj

Study on survival of hatchlings was made by culturing five day old

hatchlings for two months in earthen ponds. Survival rate recorded was 54.5% for catla. Mrigal showed a survival rate of 92.6%. In Rohu, it was 90.0% and it was only 51.7% for common carp. For the experiment, the hatchlings were brought in oxygen packing. Low percentage of survival rate was mainly due to predation by frogs, which gain entry into the pond.

In a pond of 12 m² size, stocked with catla and oommon carp with a ratio of 1:2 at a density of 15,000/ha, the net yield was 2.24 kg in six months' time amounting to a yield of 3,726 kg/ha/year. Stocking of catla, mrigal and common carp in a ratio of 4:1:5.5 in 28 m² pond at 7,500/ha density gave a net production of 2.97 kg in five months equalling 2544 kg/ha/year.

Pond conditions like temperature, pH, dissolved oxygen and light penetration were studied. Atmospheric temperature varied from 28.0 to 36.0°C and surface water temperature varied from 27.0 to 34.0°C. pH was on the alkaline side around 8.0. Light penetration was between 5 and 30 cm.

ANIMAL HUSBANDRY
(Coimbatore and Madurai Campus)

R. 1. A.H. 214 Studies on evaluating optimal length of calving interval for dairy cows
M. Mookkappan

Studies on evaluating optimal length of calving interval for dairy cows revealed that forty seven calvings of both crossbred and sindhi graded cows were taken for analysing the reproductive traits during this period. The number of inseminations required per conception was 1.8. The average length of inter-calving period was 420 days. The gestation period was 277 days. The period between last calving and postpartum oestrus was 88 days.

R. 1. A.H. 217 Feeding trials in Large White Yorkshire pigs with tapioca
R. Manickam

A feeding trial of tapioca chips in swine ration replacing maize at 100 per cent level was completed and compared with conventional ration containing maize for Large White Yorkshire pigs.

The cost of one kg of concentrate feed containing maize and tapioca chips at 60 per cent level in the ration respectively was Rs. 1.36 and Rs. 1.07. Inclusion of tapioca chips in swine ration instead of maize was found to be economical. No side effects of feeding of tapioca chips in pigs were observed.

R. 1. A.H 220 Economics of egg and poultry meat production
C. A. Gopalakrishnan and B. Kather Khan

Using 300 day old Starbrow Hybrid Broiler chicks, the cost of production for eight weeks has been worked out. It was found to be Rs. 8.36. Variable cost was about 87.56 per cent and fixed cost about 12.44 per cent.

R. 1. A. H. 221 Studies on utilization of agricultural and industrial wastes in poultry ration
R. Kadirvel

Papaya, Tapioca and Mulberry leaves were sun dried and incorporated at 5 per cent level in a layer mash containing tapioca flour and cholam. The experimental diets were fed to white leghorn birds from 24 to 36 weeks of age. Leaf meal feeding had slight adverse effect on feed efficiency. However the advantage of feeding leaf meals as a source of yolk pigment is well established.

R. 2. A. H. 204 Studies on evolving economic ration for poultry
V. Kathaperumal and P. Kannan

A feed trial on the usefulness of deoiled rice bran in chick ration replacing maize with 400 babcock day old chicks was completed. It was found that deoiled rice bran can be beneficially added up to 20 per cent without any detrimental effect in chick ration.

Hence inclusion of deoiled rice bran up to 40 per cent replacing maize in grower ration and replacing maize 20 per cent in chick ration is recommended without any ill effects in poultry feed to reduce the cost of feed.

A feeding trial to replace maize in layer ration by molasses at 0, 5, 7 and 10 per cent level was conducted with 96 star cross hybrid layers divided into four groups. There was no significant difference in the average egg yield between the treatments. But there was significant difference in the feed consumed per dozen of eggs between the treatments. Hence as there was no difference in the average egg yield between the treatments and as the feed consumption in five per cent molasses level was lowest, five per cent addition of molasses in the layer mash was recommended.

A trial was conducted with 200 Pilch broilers (0-8 weeks) to find out the effect of processing of feed on the growth rate. Processing was done by autoclaving the control feed mixing with equal amount of water at 20 pounds pressure per hour. Autoclaved mash was pressed into long threads through a dye. The threads were dried under shade and made into crumbles and stored in drums with polythene covering.

It was found that there was statistically significant decrease in gain in weight during the period of eight weeks from hatch on account of processing. Hence it is considered that this method of processing broiler feed was not effective in the growth of broilers.

R. 2. A. H. 206 Studies on the effect of pesticides residues on livestock
P. Sadasivan

Green lucerne dusted with Carbaryl 10 per cent to control insects, was fed to four weeks old broilers after 14 days of treatment, to study the effect of residual toxicity. It was concluded that lucerne treated with carbaryl 10 per cent to control insects may be fed to poultry after 14 days of treatment without any deleterious effect.

VETERINARY AND ANIMAL SCIENCES

1. **Anatomy** : (i) A study of the Oviduct of the Indian buffalo

The oviducts are more deeply located in the broad ligaments. Left oviduct is longer than the right. The bursa ovargi are absent. The epithelial height increases in the follicular stage and epithelial lined pockets in the mucosa are seen. The mucosal folds are tallest in the fimbria and thereafter gradually decrease in height, being the lowest or seldom branched in isthmus. The distal end of isthmus shows small glands in the lamina-propria. The follicular stage is characterised by occlusion of lumen with extensively branched mucosal folds, presence of more number of cilia secretion of eosinophilic material in the lumen and hypertrophy of the blood capillaries. The luteal stage is characterised by non-occlusion of the tubal lumen, sparseness of cilia, more pseudostratification, absence of eosinophilic luminal material, marked infiltration of lamina propria with lymphocytes, large number of nuclear extrusions and large number of goblet cells. The high metabolic activity during follicular stage is confirmed by intense PAS reaction, sudanophilia and alkaline-phosphatase activity in different structures in different regions. But isthmus shows more alkaline phosphatase activity in luteal stage than in follicular stage. Traces of acid phosphatase activity is seen in the superior border of epithelium. Tyrosine containing protein is also seen in superior border of epithelium. Luminal material seems to be a carbohydrate - protein complex (glyco or mucoprotein) and shows alkaline phosphatase activity.

2. **Animal nutrition** : (i) Investigation of tapioca waste as a substitute for maize in layer rations

To evolve economic layer ration by replacing maize with tapioca waste (thippi) at different levels and to find out optimum for egg lay and feed efficiency it was found that maize could be replaced up to 50% by tapioca waste without any deleterious effect on egg lay and feed efficiency.

(ii) Evaluation of effect of sunflower oilcake in poultry rations

Studies were made to find out the effect of replacing groundnut oilcake with sunflower oilcake in poultry ration. Groundnut oilcake could be replaced upto 50% by sunflower oilcake in chicks and grower rations. In layer rations sunflower oilcake can completely replace groundnut oilcake.

(iii) Investigations on the use of solid fish silage in poultry rations

Studies were made to find out the replacement value of solid fish silage in chick ration. An experiment was conducted in white leghorn chicks for a period of eight weeks to find out the use of solid fish silage in place of fish meal at 5%, 10% and 10 ppm levels. Solid fish silage could be added upto 10 parts in chick rations. But 10% of solid fish silage is more economical than 5% and 10 parts groups.

(iv) Recycling of Agricultural waste products

The feeding trial conducted at Madhavaram Milk Colony indicated that the alkali treated and autoclaved paddy husk can be incorporated upto 10% level in concentrate ration of dairy animals without affecting the performance of daily milk yield, fat and SNF percentage.

(v) Tannic acid estimation in various feeds

Tannin content of coffee seed cake (2.02%), Tamarind seeds (3.36%), banana leaves (1.85%) and Chiront seeds (0.34%) were estimated.

3. Genetics : (i) Estimation of correction factors on body weight traits in sheep and pigs

Body weights at weaning and at market ages of sheep and pigs are important economic traits considered for selection for the improvement of carcass yield. The animals in general are weighed once or twice in a month at particular dates under routine management conditions of the livestock farm. Hence it may not be possible to weigh the animal exactly at specific day of the age of the animals. Correction factors are necessary to standardise the records on body weights.

Under this project correction factors were estimated based on the date of two breeding seasons using regression analysis. Correction factors to estimate body weights at weaning (56 days) and market age of 154 and 210 days of ages in large white Yorkshire pigs and body weights at weaning (120 days) and market ages of 180, 240, 300 and 365 days in Mandya and Madras Red breeds of sheep maintained at Livestock Research Station, Kattupakkam were found out. These correction factors can be used by the pig and sheep breeders to standardise their records on body weight traits.

(ii) Response in short term egg mass in poultry

Realised and expected responses in short term egg mass due to Osborne's index selection were studied in three replicated lines in comparison with a random bred control based on 1398 pullets in the first generation. The results showed that there was an increase of 68.8 g in egg mass which amounted to 36.8 per cent of the predicted response being realised due to index selection. There was an increase of 0.58 egg in egg number, 0.69 g. in egg weight and 1.03 day in age at sexual maturity as correlated responses. There were decreases of 36.2 g, 32.4 g and 66.4 g in body weight at 20 weeks, at sexual maturity and at 40 weeks of age as correlated responses.

A selection index including four traits namely, egg number up to 40 weeks of age, average egg weight, age at sexual maturity and body weight at sexual maturity, was constructed and efficiency of restriction on each trait in the index was studied. The results indicated that restriction (keeping the mean performance of the trait in genetic equilibrium) either on body weight at maturity or egg weight will not affect the net efficiency of the index, while restriction on age at sexual maturity in the index affected considerably net efficiency of the index.

It was also observed that single trait selection for egg number was as efficient as selection index for the four traits.

(iii) Studies on blood group system in Nilgiri Sheep

Studies on R-O-i blood group system and serum alkaline phosphatase were taken up in 161 Nilgiri sheep stationed at Sheep Breeding Research Station, Sandynallah, Nilgiris, South India. Out of 161 animals studied 80 belonged to group R, 59 to group O and 22 to group I. The frequencies of the genes R and r were 0.35 and 0.65 and for I and i were 0.63 and 0.37. The concentrations of serum alkaline phosphatase ranged from 2.229 to 21.943 millimole/litre of serum and the average was 9.145 mM/lit.

There were no significant differences in SAP level among males and females. On electrophoresis the serum samples revealed two zones of alkaline phosphatase activity, a fast moving zone A, present in all the serum samples and a slow moving zone B present in all the O group sera and absent in most of R and i group sera. The rate types X and C were observed in two samples. The mean SAP level in O group animals was significantly higher than R and i group animals. The SAP level was more in animals having high intensity of B phosphatase activity (B zone).

The blood group loci in R-O-i system had no association with production traits like birth weight, weaning weight, six month weight, one year weight and annual wool yield.

4. Studies on genetics of blood potassium and haemoglobin in Nilgiri Sheep

Genetics of blood potassium, haemoglobin and transferin were studied in 948 Nilgiri, Merino and Merino Nilgiri crosses stationed at the Sheep Breeding Research Station, Sandynallah in Nilgiri hills of South India during the period from October 1971 to September 1974.

The sheep could be demarcated into two distinct populations LK and HK, based on their blood potassium concentration. The LK and HK types were found to be controlled by a pair of Mendelian genes KL and KH. The frequency of KL allele in Merino and Nilgiri breed was 0.890 and 0.376 respectively. It was 0.6 in the 1/2 Merino and 1/2 Nilgiri sheep.

There were significant differences in potassium concentration between breeds and sire groups with respect to the two populations suggesting that in addition to a pair of Mendelian genes deciding the type there are a number of modifying genes with polygenic effect which determine the actual concentration.

LK type sheep had wool of larger staple length than that of HK sheep. The medullation per cent increased with increase in potassium concentration. The regression coefficient of medullation per cent on potassium concentration (b 0.0521) was significant.

Three common haemoglobic types viz., HbA, HbAB and HbB and a rare type similar to Hbc were observed. HbB was found to be the most common type. The rare type was noticed in only one Merino (Groznev) ram. The hb type was seen to be controlled at a single locus by a pair of Mendelian genes showing codominance. The gene frequency of HbB in the sheep population was found to be 0.0840. HbA sheep had wool of large staple length and larger number of crimps. HbA sheep had higher packed cell volume than other types.

Six alleles Tf^A, Tf^B, Tf^C, Tf^D, Tf^E and Tf^M, with a frequency of 0.30, 0.16, 0.00, 0.47, 0.04 and 0.03 respectively were observed in the whole population. Eighteen phenotypes were noticed. The gene frequency of Tf^A allele in Nilgiri sheep was 0.33 which is as high as compared to other Indian sheep and this is attributed to the presence of exotic inheritance in them. TfMM sheep had wool with larger number of crimps while TfEE sheep had finer wool.

5. Studies on the Freezability of spermatozoa of buffaloes

Studies on the effect of the pH levels of Tris buffer, size of the straw and freezing rate on the freezability of buffalo spermatozoa were undertaken keeping the glycerol level and equilibrium time constant at 7% and one hour respectively and the results were statistically analysed.

The freezability of buffalo semen extended in Tris buffer with pH levels, 6.75 and 7.0 were 21.7 and 27.7 respectively and the difference was highly

significant at 1% level (P < 0.01) 0.3. Tris buffer adjusted to a pH of 7.0 was found to be better than Tris with a pH of 6.75 for freezing buffalo spermatozoa.

The freezability of buffalo spermatozoa frozen in 1.0 ml and 0.5 ml straw were 21.9 and 28.5 respectively and the difference between these two was highly significant at 1% level (P < 0.01) 0.5 ml straw was found to be better than 1.0 ml straw.

The freezability of buffalo spermatozoa frozen by adopting two freezing rates viz. slow freezing and rapid freezing were 28.8 and 21.6 respectively and the differences in the effect between freezing rates was highly significant at 1% level (P < 0.01). It was found that slow freezing rate was superior to rapid freezing for freezing buffalo spermatozoa.

(6) Possibilities to augment milk production in Madhavaram

The main object of the scheme was to augment milk production in Madhavaram block and in areas around Madras city by infusing Jersey blood in local non-descript cattle.

The following observations were made during the year.

Lactation yields at 180 days in kilograms in the rural and urban areas were 320.39 ± 47.77 and 1504.03 ± 470.14 respectively while milk yield at 305 days in kg were 675.10 ± 258.17 and 2381.18 ± 656.75, respectively.

Lactation length in days for cows in the rural area was 305.29 ± 25.38 and for the urban area it was 308.66 ± 22.5.

Percentage of conception with the use of liquid semen was assessed at 41.57 and for frozen semen 39.14. 246 crossbred calves, 102 males ± 144 females were verified and registered.

The intercalving period and dry period in days in the rural and urbanareas were 450.6 ± 121.33; 265.8 ± 205.28 and 481.57 ± 93.67; respectively.

(vii) Artificial insemination of milch cattle in Madras

The main objects of the scheme are to undertake door to door insemination of milch cattle of breeders within the city limits of Madras, bring about a genetic change in the existing population, and augment milk production utilising superior Jersey germplasm.

Data on the economic traits of crossbred cows in the city is being maintained. Percentage of conception on first insemination on actual verification was 51%. Total number of calves verified was 348. The breeding efficiency based on the number of insemination per conception worked out to 1.53.

Gestation period in days for crossbred cows was 276.36 $\pm$ 7.75 while for male calves and female calves means were 277.74 $\pm$ 6.27 and 274.68 $\pm$ 9.14. The service period in days was 122.90 $\pm$ 30.78 and the intercalving period in days was 400.62 $\pm$ 28.88.

(viii) Fundamental studies in genetics

A well equipped cytogenetics laboratory was established to strengthen fundamental studies in genetics. The leucocyte culture in human beings and domestic animals like cattle, buffalo and sheep was made to study the karyotype. A total of 120 patients were referred for chromosomal studies from the various medical institutions. Genetic syndromes due to chromosomal aberrations like Klinefilter's syndrome, Turner's syndrome, sterility due to B/E translocation, ambiguous external genitalia, Mosaicism associated with Mongolism, chronic myeloid leukaemia etc., were identified. Karyotypes of such abnormalities were made.

Among the domestic animals, chromosomal aberrations with sex chromosomal mosaicism has been recorded in a heifer with freemartinism. Karyological studies in Indian water buffaloes by leucocyte culture was conducted and the modal number chromosomes in this species was established as 50. Different banding techniques are being adopted in the construction of idiogram in this species.

(ix) Studies on the effect of milk supplied in plastic pack

There is an apprehension in the minds of people that the milk supplied in sachets (plastic pack) may be harmful for consumption in the long run. It is possible some of the materials out of which the polythene bags are manufactured may get leached out from the containers in milk during storage and may cause ill effects.

The objective of this study is to find out the effect of milk supplied in sachets by the Tamil Nadu Dairy Development Corporation by feeding to the oregon- K strain of *Drosophila melanogaster*.

The experiment was designed and carried out with three treatments viz., control (standard medium), milk supplied in bottles and milk supplied in sachets in different dilutions in the control medium. The following data were collected.

1. Percentage of survival of adult flies
2. Rate of emergence of progeny
3. Rate of productivity of the progeny (broodwise)

The data on the survivability of males and females of different treatment groups including control indicated a significant departure of proportions of survivability.

The data on the rate of emergence of the progeny (broodwise) gave the inference that between the treatments there is no significant difference but between broods there is a highly significant difference in the mean rate of productivity.

(x) Studies on genetics of blood potassium and haemoglobin in Mandya Sheep

Blood potassium, haemoglobin type and their relationship with production and reproduction traits were studied in 191 Mandya sheep. There was no significant effect of K types on body weights. However, LK (low potassium) sheep had higher lambing and weaning per cent.

HbAB sheep were heavier than HbB sheep from birth to one year of age but the differences were significant only for weaning and six months weight (P 0.01). Lambing was significantly higher in HbAB ewes (P 0.01).

4. **Bacteriology**

(i) Electrophoretic analysis of serum protein of animals

Sera from chicks of age 9 days to 37 days taken before vaccination and after vaccination with tissue culture adapted fowl pox virus (Bo au de thestrain) vaccine were analysed electrophoretically using Agar gel. Sera from post vaccination and post challenge chicks shows a highly significant increase of total serum proteins and 1 g^G fraction with a significant decrease of beta 2 (1 gA) and alpha-2 fractions.

The sera from johnin reacting sheep and non reactors which are positive to microscopic test or complement fixation test showed a high ratio of the fraction $\frac{B+a1}{r+a2}$Alb.

Electrophoretic analysis of sera of rabbit protected with Anthrax spore vaccine gave highly significant increase of gamma-2 globulin.

(ii) Surveillance on Johne's disease in sheep at Sheep Breeding Research Station, Ooty

Lambs at 1-2 weeks of age were vaccinated with imported iceland vaccine. The deaths in the farm were screened for Johne's disease. Post vaccinal nodules disappeared in vaccinated animals after 12-18 months after vaccination. Animals vaccinated as adults succumb to Johne's disease even with the persistence of nodule. Preliminary attempts on primary cultivation of mycobacterium para-tuberculosis from infected sheep was found to be successful.

(iii) Studies on hatchery sanitation

Savlon Hospital concentrate 3% in spiritus methylatus was found to be a satisfactory disinfectant for hatching eggs. Regular aerial spray of 5% formalin in spiritus methylatus is necessary to maintain satisfactory environmental hygiene of hatchery premises in A or B grade. Disinfection of hatchery floor with phenyl 5% solution or lysol 2% solution resulted in control of floor contamination in hatchery premises. Continuous fumigation of setters and hatchers for 21 days with formalin by evaporation method was found to be a satisfactory process for maintenance of incubator hygiene in A or B grades. Introduction of hatchery sanitation programme resulted in improved hatchability of eggs and livability of chicks. (Hatchability on total eggs was 82 to 84% and livability of chicks 95%).

5. **Dairy Science**
   (i) Rapid identification of sub-clinical mastitis by poly acrylamide gel electrophorosis
   (ii) Study on symbiotic effect of yeast on starter cultures in relation to preparation of good quality butter

6. **Hygiene**
   (i) A study of sanitary qualities of different poultry house litter materials and its influence on broiler performance
   S. Shanmugasundaram, M. Thiagarajan, S. Venkatasubramaniam and R. D. Michael.

Factors such as growth rate at 10 weeks in broilers, parasite ova, total bacteria, coliform and mould counts in three litres and wire floor were compared. There was no significant difference in the 10th week body weight of broiler chicks reared in different litters and wire floor. The total bacterial, coliform and mould count were significantly low in wire floor indicating its high sanitary quality. The coliform count and mortality per cent were high in saw dust indicating its inferior sanitary quality.

7. **Meat Inspection**
   (i) Studies on the preparation of chicken sausages
   K. T. Radhakrishnan, R. Ramamurthi, K. Shanmuganatham and K. R. Krishnan

The meat of spent chicken was utilized for making sausages using two formulae. The rusk bound onion flavoured sausage recorded higher taste panel rating to potato bound garlic flavoured sausage and the difference in overall acceptability was highly significant ($P < 0.01$).

The recipe can be recommended for wider application in the sausage industry.

(ii) Quality of sausage casings from sheep and goats treated with chemicals

R. Ramamurthi, E. S. Venkatesan, K. R. Krishnan, P. Ramadoss and M. Ranganathan

A study on the textural improvement of sausage casings from Sheep and Goats with chemical bleaching agents was made. Treatment with 2% sodium chloride solution of wet casings soon after cleaning was found to be superior in improving the 'feel' 'appearance' and 'strength' of casings.

The average ratings for 'feel' were 6.11 for control, 6.09 for sodium chloride treatment (0.85%), 7.37 for sodium carbonate (2%) and 6.48 for sodium carbonate (5%) treatment and the difference in effect was highly significant with an 'F' value of 18.9 ($P = 0.01$).

The average ratings for appearance was 5.95 for control and 6.07 for sodium carbonate (5%). The difference in effect of treatment with sodium carbonate (2%) was highly significant with 'F' value of 6.87 ($P = 0.01$).

The average ratings for strength were 6.20 for control, 6.19 for sodium chloride, 6.94 for sodium carbonate (2%) and 6.35 for sodium carbonate (5%). The difference in effect of treatment with 2% sodium carbonate was highly significant with an 'F' value of 12.44 (P 0.01).

(iii) A study of the preparation of certain edible and inedible offals in relation to live weight in white Yorkshire pigs

M. Chandran, C. V. Govindarajan and R. Ramamurthi

While live weight and sex separately had highly significant influence on the percentage yield of fat on live weight, only live weight had a highly significant influence on the average percentage yield of kidneys on live weight with only significant influence on the percentage yield of blood, liver, spleen, bristles and stomach and intestines. Net live weight nor sex nor their combined effect had influence on the average percentage yield of head, heart, feet, lungs and trachea.

(iv) Differentiation of beef and buffalo flesh by Immuno Double Diffusion Test

S. Stanley Rabindranath Tagore, E. S. Venkatesan and R. Ramamurthi

Hyperimmune serum was prepared against buffalo flesh and beef in rabbits. The heterologous components in either sera were absorbed by precipitation using dilute serum. The sera were successfully tested against known aqueous meat extracts by immuno double diffusion agar gel.

(v) A survey on the production and marketing of mutton in Madras City
V. Venkataramanujam and R. Ramamurthi

The study revealed a fluctuating intensity of slaughter between the year 1961 and 1974, the slaughter being the highest in 1974 with 6.81 lakh sheep and goats. The study also revealed the higher slaughter of male population in both sheep and goats. The carcass weights of sheep and goats slaughtered ranged from 5 to 8.9 kg with an average of 8.3 kg. An average loss of 0.5 kg carcass or Rs. 4.50/- was suffered on account of shrinkage and retail cutting. The butchers' profit worked out to 12.08% for wholesale butchers and 10.44% for retail butchers.

8 **Pathology**

(i) Studies on neoplasms of upper respiratory tract

Thirty three neoplasms of the upper respiratory tract were encountered during the period (9 from autopsy and 24 from field).

Squamous cell carcinoma	3
Adenocarcinoma	14
Alveolar carcinoma	13
Anaplastic carcinoma	2
Papillary carcinoma	1

Arrangements were made with Virology Department of the College for tissue culture studies for a probable viral etiology.

9. **Parasitology**

During the course of examination of clinical materials received from field staff the following rare occurrences were recorded.

a. Theileria berci in sheep
b. Babesia bovis in cattle
c. Dracuncules medinensis from dog
d. Gaigeria pachyscelis from sheep

(i) Treatment trials with a new anthelmintic Thiophanate (Nemafax-May and Baker)

Efficacy of Thiophanate (Nemafax) a new anthelmintic against gastro intestinal nematodes, tried on three batches of sheep of Livestock Research Station, Kattupakkam and compared with Thiobandazole (Thibandole-M. S. D) a known anthelmintic indicated that the new drug was effective and compared favourably with Thiobendazole.

(ii) Therapeutic and Prophylactic control of Nasal Schistosomiasis (from 1. 8. 74 to 31. 1. 77)

Sodium antimony tartrate (SAT) and Sodium antimonyl - dimethyl cysteintartrate (NAP) the two Schistosomicidal drugs were tried on cattle suffering from Nasal Schistosomiasis and the animals were observed for cure and relapse.

(iii) Studies on immunisation against tropical Theileriasis (*Theileria annualata*) in catlle in Tamil Nadu (functioning from 30.8.1974)

2005 Blood smears were collected from endemic areas of the State and examined for Theileriasis. Of these 103 were positive for *Theileria annualata* of which 86 were from cross bred and 17 from indigenous animals. Lymph gland smear of 26 cross bred and 5 indigenous animals of the positive cases revealed Koch's blue bodies.

Of the 33 collections of ticks consisting of 5 genera and 8 species, collected from suspected animals, three species, *Boophilus microplus, Haemophysalis bispinosa* and *Hyalomma marginatum isaaci* were recovered from positive animals.

The presence of the developmental stages of the Parasite, in the tick vector was investigated. The squash preparation of the salivary gland of infected *H. bispinosa* tick revealed bodies indisguishable from those of Multiple fission bodies of *T. annulata*.

Preliminary work on Lymphocytic cell suspension culture was done.

Immune serum prevented the set up of infection in experimental calf.

Therapeutic agent 'Nivaquin' did not prevent the set up of infection in experimental calf.

Electrophoretic analyses of the Immune sera were studied.

(iv) Scheme for studies on the incidence, bionomics role in the causation of disease with special reference to transmission of piroplasmosis and control of ticks of domestic stock.

Ornithodoros savignyi has completed its life cycle in 165 dsys on bovine host. Histopathological studies on skin infested with *Boophilus microplus, Haemaphysalis intermedia* and *Hyalomma marginatum isaaci* reveal chronic or subacute dermatitis with eosinophilic and lymphocytic infiltration. A. tickicide 'Baygon' was effective against *B. microplus* infestation on a Bullock in four days. 'Actellic' and 'Aolone' kill *Rhipicephalus sanguineus* in 4-5 days. But these chemicals did not possess much of residual effect.

The transovarian transmission of *Babesia bigemina* and *Babesia canis* Infections in cattle and dog by *B. microplus* and *R. sanguineus*

has been proved. Infected nymph and adult of *R. sanguineus* transmitted *B. canis* infection in dogs.

Adult *H. marginatum isaaci* infected with *B. bigemina* transmitted the infection in cattle.

Infection with *B. bigemina* and *B. canis* was established by intravenous administration of infected blood.

The larvae, nymphs and Adults of infected *B. microplus* revealed bodies indistinguishable from the vermicules of *B. bigemina*.

The nymphs and adults of infected *R. sanguineus* revealed fission bodies and bodies indistinguishable from sporozoites of *B. canis* respectively.

10. Pharmacology :

(i) Studies on xylazine as pre-anaesthetic agent in dogs
K. C. Raghavan, B. Gowrisankar and V.M. Ramaswamy

In this study xylazine was tried as a pre-anaesthetic agent before thiopental anaesthesia in doses of 0.5, 1.0 and 1.5 mg/kg body weight administered subcutaneously. It was concluded that xylazine can be used as a pre-anaesthetic in dogs in 0.5 mg/kg or 1 mg/kg doses.

(ii) Studies on the protective effect of Phyllanthus niruri in experimentally induced liver damage with carbontetrachloride in dogs
H.C. Samanna and V.M. Ramaswamy

The aqueous extract of *Phyllanthus niruri* equivalent to 1 gram of fresh leaves and roots in 3 ml was administered at the rate of 45 ml per dose thrice daily by stomach tube for 15 days prior to carbontetrachloride administration and continued for another 15 days thereafter and the enzyme (SGOT and SGPT) activities were estimated. It is recommended that the aqueous extract of this plant may be tried in the treatment of hepatits in canines.

11. Preventive Medicine:

(i) Vaccination trials in poultry

Trials with RDVF and RDVK phase I vaccination trials with RDVF and RDVK for studying the post vaccination paralysis in the poultry and to evaluate the immune status at various periods of the vaccinations. It was found that birds, vaccinated at 6th week without any previous protection withstood the challenge trial better than with primary immunisation with RDVF.

(ii) Studies on the use of Trodax in the treatment of Ancylo-stomiasis in dogs.

Ten clinical cases, five cases of therapy and autopsy confirmation have been studied. The drug is found to be quite effective in the treatment of Ancylostoimasis in dogs.

(iii). Studies on haematuria caused by mexaform in dogs

Thirty two clinical cases and four cases of administration and autopsy examinations have been studied. It is conclusively proved that the drug mexaform causes severe haemorrhagic cystities in dogs.

(iv) Studies on use of turmeric paste in dogs
Eighteen cases have been studied clinically wherein neem leaf, turmericpaste was applied externally or given orally or in combination and in the majority of cases the results are encouraging.

(v) Studies on the immune status of sheep vaccinated against Johne's disease by complement fixation test.

The status of 319 sheep immunised with Iceland Strain of Johne's disease vaccine, 56 animals, those were ailing from the clinical disease confirmed by bacteriological examinations was studied and compared with the nodule formation on vaccination. The results indicate that vaccination conferred a good degree of immunity as examined seriologically and by the presence of nodule.

(vi) A study of incidence of Brucellosis in human and animals in and around the city.

In all 1684 sera samples from animals and 383 human sera were tested for evidence of Brucellosis. Out of 855 sera from cattle in organised farms 14 were positive by STAT and 10 were by C.F.T. Out of 179 samples from cattle under different management conditions eight were positive and 19 showed low litres. Out of 300 sheep and goats and 350 cattle sera from slaughter house 22 were positive for Brucellosis. Out of 308 human sera (208 from P. UO and 96 from blood bank donors and 79 from SH workers) 51 were of low litres and three of high litres.

12. Surgery :

(i) Investigation on keratitis and Keratoconjunctivitis in calves and their treatment:
E. I. Rajendran, Godfray David and M. S. Gopal

The object of the scheme is to study cases of Keratoconjunctivitis in calves under three groups namely (i) cases treated with antibiotics (2) cases treated with antibiotics and vitamin A. (3) cases treated with antibiotics, cortisones and vitamin A. Totally 49 cases were treated under the groups. The antibiotics that were used in the trial were chloromycetin and terramycin and the cortisone that was used, was Dexamethsone. Injection

of vitamin A was found to accelerate the healing of corneal ulcers. In 10 cases vitamin A estimation was made and found to be 80 mg/100 ml which was above normal. Cultural examination in 11 cases revealed Staphylococci and gram negative rods.

(ii) Clinical assessment of the healing property of 'himax' ointment in the treatment of wounds in cattle
E. I. Rajendran, Godfray David and M. S. Gopal

The object of the scheme was to assess the healing properties of himax ointment in fresh wounds, infected wounds, fly-blown wounds, bursal enlargements and chronic inflammatory conditions of tendons and ligaments foot and horn injuries. The ointment was found useful as a wound dressing in chronic wounds, infected wounds, fly-blown wounds and injuries of the foot and horn. It was not useful in the treatment of bursal enlargements and chronic inflamatory conditions of the tendons and ligament.

13. **Therapeutics**

Berenil (Hoechst) was found to be effective in the treatment of Bovine Babesiosis and a substitute for Babesan (ICI) which is not available now. Non-specific Bovine Fever was also studied in relation to the Haematological and Electrolyte changes and the presence of microbes in blood.

14. **Poultry Science**

(i) A study was conducted to find out the degree of correlation of clutch size, age at sexual maturity, body weight at housing (20 weeks) and 40 weeks production in White Leghorn pullets. It was concluded that average clutch size could be a valuable selection tool and further investigations are being continued.

B. Sethuraman, F. R. Sheriff, A. R. Krishnan and P. Kothandaraman

(ii) The use of Emetryl as a feed additive in increasing broiler production utilizing New Hampshire Chicks was investigated. The addition gave highly significant increase in market weight. Mean body weight of control group was 1142.5 g while the treatment group had a mean of 1254.7 g. Addition of Emetryl also improved the feed efficiency from 2.75 to 2.65.

K. Vedanayakam, F. R. Sheriff and P. Kothandaraman

Effect of preslaughter fast on the dressing yield of White Rock fowls was investigated. It was found that when briolers were fasted for 0, 6 and 12 hours prior to slaughter, the fasted groups gave a significantly better dressing percentage yield than the non-fasted group.

15. Laboratory Animal Medicine

(i) Raising inbred strains of Laboratory animals and study on the breeding characters of Laboratory animals
R. Srinivasan and K. V. Venkoba Rao

The particulars such as litter strength, litter weight, litter weaned, sex ratio, weaning weight, age and weight at first litter and growth rate were studied in Laboratory animals.

(ii) Study on the normal Haemogram of Laboratory animals
R. Srinivasan and Venkoba Rao

62 samples of blood from rabbits and 52 samples of blood from Guinea pigs have been examined for total Red Blood cell (RBC) count, total White Blood Cell (WBC) count, Haemoglobin (Hb) content, Erythrocyte Sedimentation Rate (ESR), Packed cell volume (PCV) and differential count (D. C).

(iii) Study on the common diseases of Laboratory animals
A. M. Shanmugan and C. Kumaraswamy

Study on the treatment and control of worm infestation in Laboratory animal is in progress
A. M. Shanmugam and C. Kumaraswamy

Mansonil was found to be effective against tap worm infection in rats.

16. Obstetrics

(i) Endocrinology Unit
T. M. Thangaraj

Eight groups, 20 in each group of Repeat Breeding She Buffaloes were tried with combination of oestrogen and antibiotics. Highest percentage of conception (i. e.) 30% was obtained with the use of streptopencillin and vetoserol given as intravenous infusion in 20 ml of distilled water.

(ii) Studies on Bovine endometrium secretions

Under this project, uterine fluid was drawn from 100 regular and 100 repeat Breeding cows and were analysed for glucose and alkaline phosphatase content. Regular breeders gave 43.30 mg glucose/100 ml and 69.96 mm/litre per hour of alkaline phosphatase, while repeat breeders were found to contain 35.12 mg glucose per 100 ml and 55.30 mm/litre/hour of alkaline phosphate. Under phase No. 3 of this project, 20 repeat breeding cows were selected for treatment and were being followed up.

17. Livestock Research Station, Kattupakkam

(i) Cross Breeding of Mandya and Madras Red Breeds of sheep
B. V. Ramachandran

Performance of ewes of Mandya, Madras Red and their First crosses are studied during the year. First cross showed a significantly higher performance in the joining rate (Mandya 91.20%, Madras Red 86.30% and First crosses 93.75%). Weaning rate of Lambs did not show any significant difference though the cross Lambs were heavier.

Net productivity of ewes showed positive gains in cross Breeding yielding 25%, 50% and 75% Mandya Blood level groups from 6% to 30% average pure breeds (except 75% Mandya group) up to weaning. The 75% Mandya Blood level group showed a negative difference from 0.72% to 12.59%.

(ii) Genetics studies in sheep
D. Ganeshkale and N. Durai Raja

The performance of the flock under study during the year is estimated for the two native breeds. The lambing percentages are 72.45% for Madras Red and 75.93% for Mandya. Preweaning mortality is 2.90% (2/69) and 2.44% (2/83) respectively for Madras Red and Mandya. Mean body weights at weaning (4 months) are 10.62+1.64 kg (55) and 10.28+1.63 kg (69) for Madras Red and Mandya. Madras Red weighed 13.52+3.55 kg (52) and Mandya 12.58 + 2.24 kg (68) at 8 months age.

Heritability Coefficient for First year body weight of Madras Red and Mandya were estimated with pooled records and the heritability Coefficient is 0.19±0.18 for Madras Red and 0.23±0.13 for Mandya.

Incidence of cryptorchidism among Mandya is 26.02% (102/392) and a positive correlation to pooled condition is also noticed. No horned Mandya is found to be Cryptorchid. If horned Mandya Rams are used for Breeding the Genetic defect, crytorchidism can be practically eliminated.

(iii) Determination of Genetic parameters of economic traits in Large white yorkshire pigs
S. Jayarajan and K. Chockalingam

The mean Litter size (Total), Litter size born alive and Litter size at weaning (8 weeks) were 9.72, 7.64 and 7.00 respectively. The mean body weight at birth and at weaning (8 weeks) were 1.25 kg and 10.85 kg. The performance of the economic traits have been improved to the level of obtaining 63 kg in 154 days with a feed efficiency of 3.0.

(iv) Study on economic growth potential in rearing fatteners
S. Jayarajan and K. Chockalingam

Under the project one trial with 40 castrated male piglets was completed. In this trial of 140 days duration a sum of Rs. 1070.63 was the profit after meeting all the expenditure like cost of weaned piglets, feed cost, labour cost, rent on buildings and utilities, charges for transport, slaughter and dressing and supervisory charges of 10% of the total emoluments of Assistant Research Officer.

(v) Studies on Comparative utility of ordinary maize, Lysine rich maize and Tapioca in pig ration
P. S. Ramaswamy and R. Vijayakumar

There is no difference either by the addition of Lysine or by substitution of Lysine rich maize to the maize portion of a normal ration. Addition of Lysine increased the cost of feed. So a normal ration which was formulated for this experiment has got adequate protein and Lysine for the growth of pigs.

The tapioca can replace the maize partly and fully, provided the protein percentage in the ration is met by the addition of increased quantity of available groundnut cake at a cheaper rate.

(vi) Studies on the effect of plane of nutrition on male Buffalo calves for meat production
V. Lakshmipathi and M. Govindarajulu

The first trial with 30 Murrah male Buffalo calves divided into 4 groups put under 4 treatments with 2 planes of nutrition at different (at 3, 6, 9, and 12 months of age into slaughter weight i.e. 300 kg). The consumption of food in relation to growth is evaluated in terms of DCP and TDN and the carcass characteristics for 5 animals that have reached slaughter weight of 300 kg. The work is in progress.

(vii) Optimum fodder and concentrate feeding
V. Viswanathan and K. Mahadevan

One trial has been completed keeping the objective in view that minimum amount of concentrate and maximum utilisation of roughages available for the growth and milk production of cows. Low producing type of cows, (yielding below 5 litres of milk) and medium producing type of cows (yielding between 5 to 10 litres of milk) have been used in the trial and the following are the observations recorded during the first trial.

A) Low producing type of cows: (yielding below 5 litres)

The group of cows kept on concentrates plus para grass feeding

(control group) have yielded an average 3.23 kg of milk per day. The group of cows kept on lucerne plus para grass feeding (Experiment group) have yielded on an average 3.14 kg per day during the experimental period of six months lactation.

B) Medium producing type of cows: (yielding between 5 to 10 litres of milk)

The group of cows kept on concentrate plus para grass feeding (control group) have yielded on an average 4.89 kg milk per day. The group cows kept on lucerne plus para grass feeding (Experiment group) have yielded on an average 4.81 kg of milk per day during the experimental period of six months lactation.

(viii) Determination of Genetic parameters of economic traits in Murrah Buffaloes
S. Kannan Chandrasekaran and R. Jayakumar

When compared to last year's performance of the Murrah buffalo herd, during the year following results were obtained. There is increase of birth weight by 0.8 kg. Post partum service period, dry period and Intercalving period are reduced by 205, 141 and 197 days respectively. Lactation period increased by 29 days. Thus the means of the above traits during this year are, birth weight 32.8 kg, post partum service period 76 days, dry period 111 days, intercalving period 385 days and lactation length 325 days.

(ix) Progeny Testing Scheme
M. Md. Habibulla khan and P Kanagaraj

(i) The following buffalo bulls were put to test: 13, 14, 23, 26, 27, 28, 29, 30 45, 68 and 78. The work is in progress.

(x) Developing high yielding strains of poultry by using Index selection
K Natarajan, R. Kumararaj, V. Venkataramanujam and R. Ayyaluswamy

During the period under report the mean hatch weight of chicks, weight at 20 weeks, weight at maturity were respectively 39.92 g, 1070.8 g, 1313.1 g.

Mean age at maturity and age at 50% production were 186.8 days and 211 days.

The percentage of mortality between 0 to 20 weeks was found to be 6.1%.

The Mean Hen day production, Hen Housed prduction upto 40 weeks of age are 37.2% and 47.7%. The work is in progress.

(xi) Studies on Fodder crop-Legume mixture evaluation of sorghums with various legumes under rainfed conditions.
T. Sivaraman, V. Seetharaman and M. R. Viswanathan

Two productive value (both quantitatively and qualitatively) of the two varieties of Fodder sorghums, viz., K3 Irungu Cholam and I. S. 3541 male line and their productive performance in combination with common legumes viz., pillipesera, cowpea, clusterbeans and field beans were studied in this trial. During the period under report trial was in progress and samples of fodder are under analysis for their dry matter, gross energy and crude protein content.

The analysis of samples of first trial harvested in 1975-76 was completed during the year under report. The yield of K3 Irungu cholam and IS. 3541 male line were 9757 kg and 9452 kg per hectare, respectively The legume combinations with K3 Irungu Cholam ranged from 9225 kg to 10825 kg while that of IS 3541 male line with legumes ranged from 10082 kg to 11176 kg The dry matter content in K cholam was 33.7 and 32.5% to 34.2% with various legume combinations while the same was 20.6% in IS 3541 male line and 19.8 to 20.9% in its combinations with various legumes. The crude protein content in K3 Irungu cholam was 4.3% and 4.5% to 5% in its combinations with legumes while the same was 5.2% in IS 3541 male line and 5.6 to 5.7% in its combinations white legumes.

The Gross energy in K3 Irungu cholam was 3.7 K. cal/gm and 3.6 - 3.7 K. Cal/gm in its combinations with legumes, while the same was 3.7 K. Cal/gm in its combination with legumes, while the same was 3.7 K Cal/gm in IS 3541 male line and 3.6 to 3.7 K. Cal/gm in its combinations with legumes.

Final recommendation can be made on conclusions to be drawn after the data of analysis for second trial are recorded.

18. SHEEP BREEDING RESEARCH STATION, SANDYNALLAH, OOTACAMUND

Objectives : The objective of this station is to serve as a nucleus Merino farm, to serve as a training centre for Post-Graduate and Under Graduate Students of Veterinary Science, to conduct research in sheep husbandry, to serve as a demonstration and experimental station for scientific sheep husbandry and to provide personalised service to sheep farmers in the district.

Salient findings of the Reserch work : Artificial insemination in sheep was carried out in the station during the year for the first time in South India with a high conception rate of 74%.

Cross breeding of Nilgiri ewes with Merino and Rambouillet rams was done. The cross bred sheep were found to be superior to Nilgiri sheep in body

weight at 180 days. The cross breds were also found to have higher wool yield at 180 days as compared to Nilgiri sheep

(i) Concentrate supplemental feeding of weaned lambs
K. Mallikeswaran and T. Sivaraman

The study was undertaken at fine wool sheep breeding research station situated in Nilgiri hills, predominently having grass cover with no legume combination to assess the value of concentrate supplementation for growing lambs at different levels. The grass consisted of mainly kikiyu (*Pennisetum clandestinum*).

The growth rate and wool yield was more in the groups maintained with supplementation than those maintained on grazing alone. The staple length was slightly influenced by concentrate supplementation and the fineness of wool fibre in terms of fibre diameter was inversely proportional to the level of concentrates.

The concentrate supplementation in the case of high yielding animals like Merinos gave better economic return than in native Nilgiri and cross-breds and that it was marginal in cross breds.

(ii) Physiological parameters in South Indian fine wool sheep-'Nilgiri-Dentition
K. S. Raman and T. Sivaraman

A study on ageing of native Nilgiri sheep in temperate zone (hills) was done with 296 (224 lambs + 72 adults) animals.

Ageing in lambs : The age of new born lambs could be assessed fairly and accurately by observing the eruption of milk teeth. This could be done upto the age of two months.

Age by dentition in adult animals could be fairly and accurately assesesed from an age of 1½ years to about 4 years based on permanent dentition irrespective of the sex.

(iii) Estimation of correction factors for live weights at different ages
K. Mallikeswaran and P. Subramanian

Correction factors for correcting weight to a specific age (120, 180, 240 300 and 360 days of age) in both sexes of Merino (Stavropol), Merino (Grozney) and 5/8 Merino grades were worked out.

SHEEP FARM KOLATHUR, SALEM DISTRICT

Scheme for Studies on Carcass Characteristics of Mecheri and Mandya lands

(i) Studies on the influence of age on Economics of Production and Carcass qualities in Mecheri Sheep
M. P. Arumugam and A. M. Ramaswamy

A total of 44 weaned Mecheri Ram lambs were received from Sheep Farm, Chinna-salem and they were devided into four slaughter age groups viz. 6 months, 9 months, 12 months and 15 months. All the lambs were maintained under natural pasture alone. As and when the lambs reached the desired age they were slaughtered and the economics of production were worked out.

Of the three groups slaughtered so far (6 months, 9 months and 12 months) the profit was higher in 9 months age group.

The break even level of mutton per kg was also worked out. The break even level of price of mutton per kg in 9 month slaughter age group was Rs. 6.54 and in 6 month it was Rs. 7.96 and in 12 month it was Rs. 7.77.

There was no significant difference in the average daily gain in all the three groups.

5. EXTENSION EDUCATION

The Directorate of Extension Education is serving as the link between the research workers of the University and extension workers of the development departments of the State Government and farmers The Communication Centre of the Directorate is processing the research findings for dissemination to farmers through the extension workers and mass media like All India Radio, newspapers, magazines etc. It forges the free exchange of ideas and brings the field problems to the research laboratory and does the feed-back system very effective and purposeful. The Communication Centre and the Farmers Training Centre at the Main Campus, the Farmers Training Centre and the National Demonstration Scheme at Madurai Campus, the Krishi Vigyan Kendra (Agricultural Polytechnic) Pondicherry and the four Farm Advisory Councils at Coimbatore, Madurai, Kaveripattinam, and Periyakulam are involved in the extension education activities in the University. During September 1976 the Communication Centre was strengthened with the addition of a post of Assistant Director (Information) to pool the information from different Centres of the University and help in disseminating the same to the farming community and those visit the University Main Campus at Coimbatore.

5. 1. Training Programmes

The following training programmes were organised in the Main Campus and other centres of the University.

Kharif training for District Agricultural Officers of Coimbatore, Salem and Dharmapuri Districts on recent methods of pest control on May 13, 1976; Training for Intensive Cotton Development Programme staff of Coimbatore, Erode and Pollachi divisions on cotton cultivation for three days from May 20 - 22, 1976; Training for Deputy Agricultural Officers of Coimbatore and Pollachi divisions on plant protection for four days from May 22 - 26, 1976.

A three week training in Agriculture for 15 unemployed educated youth from June 3, 1976; One week training to two I.A.S. Probationers from August 18, 1976 on various research and extension education activities of the University were imparted.

Two Deputy Agricultural Officers (Farm Management) were given training in Fodder Production from August 7 - 21, 1976. A similar training

for a second batch was given from August 23, 1976. The Department of Seed Technology gave training to the official of the Thudiyalur Co-operative Agricultural Services Society in Seed Technology for a period of four weeks in August, 1976.

Four I.A.S. Probationers were given training for one week commencing from August 26, 1976. Training on Cotton Production was given to 15 Agricultural Graduates of the Madras Fretilizers Limited - August 30-31, 1976. Training in Fodder Production for two batches of Farm Managers of District Livestock Farms were given from August 23 - September 1976 and from September 8 - 22.

The Extension Officer (Training) Central Institute of Fisheries Technology, I.C.A.R. Cochin was given Extension Training from September 14 - 18, 1976. The Department of Animal Husbandry at the Madurai Campus gave training to six farmers in Fodder Cultivation and trained three unemployed youths of ReddiyarChatram Block for establishing three piggery units.

A three month Soil Health Care training programme for the first batch of 10 candidates commenced on September 1, 1976 at the Madurai Campus.

Five Deputy Agricultural Officers (Farm Management) from the Department of Animal Husbandry and Tamil Nadu Dairy Development Corporation were given training in Fodder Production from September 27 - October 11 and October 15-29, 1976 in two batches.

Ten entrepreneurs were given training in farm machinery development and production from October 4 to 9, 1976.

Twentysix District Agricultural Officers and Block Development Officers from the State were given training in Rice Production under the Minikit Programme of the Ministry of Agriculture and Irrigation, Government of India during October 5-8, 1976. Twelve Project Officers of Small Farmers Development Agency underwent training in Resource Use Planning during October 11-20, 1976. A training on Pest Surveillance was given to 35 Deputy Agricultural Officers (Plant Protection) on October 21-22, 1976.

Six Probationery Deputy Collectors were given training in research and extension education activities of the University from October 7 to 13, 1976 and One Indian Foreign Service Trainee on October 13, 1976.

A training programme for a period of one month for Chemistry Teachers of Colleges was offered from November 15, 1976 on Soil Health Care under the auspices of I.C.A.R. A two week training on Soil and Water

Conservation Technology was given to 27 officers working in Drought Prone Area Programme in six different states of Peninsular India from November 15,1976.

Nine District Agricultural Officers of the State Department of Agriculture were given training on Resource Use Planning during November 1-12, 1976. A four week training for unemployed graduates in Plant Disease Control and Mushroom Culture was completed on October 30, 1976. The three month Soil Health Care training programme at Madurai for ten Village Youths was started on November 30,1976.

Thirty one Ex-bonded labourers were given training in agricultural practices in Agricultural Research Station, Bhavanisagar for five days from January 18 - 22, 1977.

The second batch of training on Soil and Water Conservation Technology was offered to the officers working in Drought Prone Area Programme in six States from February 7 - 10, 1977. A second batch of training in Rice Production under Minikit Programme of the Ministry of Agriculture and Irrigation was given during February 23-26, 1977.

5. 2. **Farm Advisory Council**

The Farm Advisory Councils at Coimbatore, Madurai, Periyakulam and Kaveripattinam played an important role during the year and tackled the following problems of the farmers brought to the notice of the University by the Development Departments which could not be solved by the local extension agency:

1. Nematode attack of Crossandra
2. Poor yield and growth of Grapevine
3. Poor square formation in MCU.5 cotton in rice fallows
4. Prevention of erosion caused by River Bhavani near Mettupalayam
5. Non-flowering of paddy even after 90 days
6. Thanjavur wilt on Coconut.
7. Nematode attack on Maize
8. Poor growth in Robusta banana
9. New pest on Paddy in Musiri Division (Tiruchirappali District)
10. *Prodenia* on Cotton which could not be controlled by common pesticides
11. Pests and diseases on Banana and Chillies in Salem Division
12. Finding the suitability of the soil to raise Sugarcane in Madurai District
13. Die-back disease in Guava
14. Bark Caterpillar in Guava
15. Black headed Caterpillar in Coconut trees

16. Mango trees of 10 - 12 years old not bearing
17. Poor bearing of Coconut
18. Cross-bred Cows not conceiving
19. Non-formation of tubers in Sweet Potato
20. Aphid attack in Chillies
21. Boll worm attack in Cotton
22. Mosaic and leaf curl disease in Tomato
23. Stem borer attack in Mango
24. Non-formation of earheads in Ragi
25. Bacterial blight in Karuna and Kannagi Paddy
26. Deficiency symptom in Sugarcane
27. Tip sterility in Co. 10 Ragi
28. Bunchy top in Banana
29. Alkali soils
30. Poor yield in fruit trees like Guava
31. Yellowing of leaves and decline in Guava
32. Control of powdery mildew, fruit drop, insect pests, deficiency disease and Loranthus in Mandarin Oranges.
33. Leaf miner and tristeze disease in Acid Limes
34. Stem borer and leaf roller in Paddy
35. Mite attack in Cotton
36. Retarded growth in four month old Robusta banana
37. Yellowing and drying of Bean plants grown as intercrop in Cotton
38. Poor growth in a patch of about 60 cents in two acres of Robusta banana
39. Sparse bearing in ten year old Coconut
40. Drying up of paddy at grain maturing stage
41. Flower crop in Varalakshmi cotton
42. Poor flush growth in Seedless Grapes even two months after pruning
43. Unhealthy growth and dwindling flower production in Crossandra
44. Dropping of fruits in Muscat Grapes
45. Advisability of growing grapes
46. Animals getting weak and not coming to heat
47. Yellowing and dropping of leaves in Robusta banana at Kottur
48. Uneven bud burst and powdery mildew in Anab-e-Shahi Grapes
49. Irregular and low bearing in coconut
50. Frequent mortality of White Leghorn Chicks
51. Yellowing of Robusta banana at Thattakkal, Kaveripatnam and Yerrahalli
52. Nephantis attack in coconut plantation

5. 3. Farmers Training Centres

There are three Farmers Training Centres one each at Coimbatore, Madurai and Orathanad. These centres arrange for short training programmes for the farmers. The training programmmes and activities are detailed below:

5. 3. 1. Institutional Training Camps

The Institutional Training Camp otherwise called as specialised short course was conducted for four days both for farm men and women. For each course 25 persons selected by the Block Extension staff as well as the Conveners of Farmers Discussion Groups were admitted. The modern agronomic practices such as proper season, use of optimum seed rate, seed treatment, placement of fertilizers, weed control, water management, integrated pest and disease control etc., were explained in detail with the help of method demonstration and other audio visual aids. Besides, maintenance of milch animals, poultry keeping, storage of grains, rat control, preparation of recipe with high yielding varieties of paddy, cholam, cumbu, ragi, maize, pulses, nutritive value of food etc. were also discussed. Field trips were arranged as part of the training programme to study the performance of new varieties and techniques.

During the year 1976-77, the Farmers Training Centre, Coimbatore conducted 20 Institutional Training Camps, ten each for men and women farmers benefitting 275 men farmers and 295 women farmers. The Madurai Centre conducted 10 such trainings for farm men and 10 for the farm women separately and 254 and 252 persons were trained respectively.

5. 3-2 Peripatetic Training Camps

This production-cum-demonstration camp of one day duration was conducted in the holdings of farmers with special emphasis on varietal, cultural and pesticide demonstrations on high yielding varieties of crops. During the year, the Coimbatore Centre organised 107 demonstration camps and thereby 1470 farmers were benefitted. The Madurai Centre conducted 50 for the farmers and 20 for farm-women benefitting 1076 and 545 persons respectively.

5. 3-4 Farmers Discussion Groups

These are the voluntary organisations at village level. These organisations play an important role in disseminating the agricultural innovations in rural areas. The Farmers Training Centres assisted these groups by supplying technical bulletins periodically, answered querries through correspondence and personal contacts. At Coimbatore Centre, 19 men and 14 women groups were formed newly during the year. Four groups

were formed by the Madurai Centre. In Coimbatore Centre, 263 Farmers Discussion Groups (men) and 108 for women are functioning effectively.

In order to accelerate the activities of the conveners, prizes were awarded in the form of Transistors and Merit Certificates to the best 7 conveners in Coimbatore District and 6 conveners in Madurai District.

The Farmers Discussion Group at Silvarpatti Village in Madurai district was adjudged as the best Farmers Discussion Groups in 1975 and it was awarded with the Rolling Shield and books worth about Rs. 300/- by the All India Radio, Tiruchirapalli in the 10th Anniversary Celebration of Farm and Home Unit of All India Radio, Tiruchirapalli.

5. 3. 5 **Pre-seasonal Training**

This training was given to the conveners and progressive farmers to equip themselves with the latest Information regarding crop production for the particular season. The Coimbatore centre organised 32 pre-seasonal trainings and benefitted 984 farmers. Similarly, eight such training programmes were conducted by the Madurai centre.

5. 3. 6 **Seminars and Village Meetings**

Thirteen Seminars were conducted at Coimbatore Centre on paddy, millets, cotton, groundnut etc., involving the experts of Tamil Nadu Agricultural University, Department of Agriculture personnel and farmers. At Madurai centre eight such seminars cum trainings were conducted. The conveners also participated in the seminars organised by the local extension agency.

The Coimbatore centre organised 24 village meetings and thereby benefitted 785 farmers.

5. 3. 7 **Functional Literacy Programme**

This is an integral part of the programme of the Farmers Training Centre. The trainers of Functional Literacy group from the Department of Education were trained on Agricultural aspects to promote literacy level among illeterate farmers. In Coimbatore, this project is functioning at Perur, Madukkarai, Palladam, Sulur and Sultanpet blocks. Sixty centres in Madurai district were visited periodically and suggestions were given to the teachers for implementing the programme effectively. One day seminar was organised by the Farmers Training Centre, Madurai to find out the difficulties experienced by the teachers and to discuss the ways and means to improve the tempo of this programme.

5. 3. 8 **Information Support**

The Coimbatore Centre continued to publish the monthly Tamil journal 'Kalanjiyam' and distributed to the conveners at free of cost

Tho Farmers Training Centre, Madurai printed and published 'Ulavar Madal' the mothly journal to all the conveners and extension workers in Maduari district. Recent findings, success stories, seasonal cultivation, hints on important crops. All India Radio Programme for the month, latest findings, question and answer etc., are some of the important features of these journals.

In addition to this, about 1500-2000 Tamil Nadu Agricultural University publications were purchased by the Farmers Training Centres and distributed to the conveners and other ryots.

All the Farmers Discussion Groups were enrolled for the quarterly journal 'Valarum Velanmai' by the Farmers Training Centre, Madurai and Coimbatore.

Farmers Training Centre as Field Laboratory to Students

The Farmers Training Centres served as Field Laboratory to the students of the Tamil Nadu Agricultural University. In Peripatetic Demonstration camps and Institutional Camps organised by the Farmers Training Centre, students were given opportunity to address the farmers and conducted method demonstrations on various improved practices.

5. 3-9. **Campaigns**

The Coimbatore Centre organised two Campaigns involving the B.Sc (Ag.), Students to control the fulgorid pest in paddy fields of Athani and Nanjai Puliyampatti areas. Rat Eradication Campaigns were organised by involving students at Somayanur on February 10 and Annamalai on March 7, 1977. The conveners of Madurai District participated in the Campaigns organised by the block extension staff in tree planting, mass ground spraying etc.

5. 3-10. **Other activities**

The Coimbatore centre conducted special training classes for the girl students of Nirmala College about Kitchen gardening. It also organised training classes for the Nehru Yuvak Kendra members. They were also taken round the research stations, dairy farms etc. of the University.

The Madurai Centre, with the active co-operation of the women conveners, laid out kitchen gardens in 20 villages round about Madurai City. In the village adopted by the Agricultural College and Research Institute, Madurai, the following works were attended by the Farmers Training Centre, Madurai.

i) Forming Farmers Discussion Groups
ii) Raising Kitchen Garden
iii) Production-cum-demonstration camps

iv) Planting Papaya, Curry leaf seedlings and
v) Conducting film shows.

5. 4. National Demonstrations

All India Co-ordinated programme on National Demonstration on major food crops in Madurai District is continued during the year 1976-77, by the Tamil Nadu Agricultural University with the objective of conducting demonstrations to educate the farmers with the new technology for maximising the productivity from unit area of land in unit time. The productive research findings were demonstrated in the farmers' fields in the various agro-climatic regions of the district. Intensive cultivation and multiple cropping programmes with high yielding varieties of various crops adopted in the National Demonstration demonstrated to the farmers the modern technology and scientific methods of agriculture for producing maximum yields from unit area in unit time.

Twenty four demonstrations on different crop sequences and a special demonstration on problem soil are being conducted during this year. Among these, three-crop sequences are adopted in six demonstrations, two-crop sequences in thirteen demonstrations and single crop in six demonstrations.

Paddy is the major corp in the demonstrations as it is the main crop of the district. Paddy crop grown in the first season has been harvested at few centres and the yields from all the demonstrations were above the targets fixed by the I.C.A.R. for paddy crop. Grain yield of 7040 kg/ha from Kannagi, 6336 kg/ha from IR. 20. 6076 kg/ha from Co. 36 and 5837 kg/ha from Vaigai have been harvested in the first season.

Two of the pre-release paddy cultures TNAU 658 and TNAU 14562 were grown in one demonstration each in the first season and they have yielded 6775 kg/ha and 6483 kg/ha of grains respectively.

Under the special demonstration programme an alkaine land has been reclaimed by applying 5 tonnes of gypsum as calculated by the method of Shawarby and the pH of the soil has come down to 8.3 from 9.6. The demonstration is in progress. Due to failure of monsoon rains, and delayed release of water in the Periar canals, three-crop sequences could not be planned at more centres. Only at centres, where there is additional source of well-irrigation, three-crop sequences have been programmed to be demonstratedr Latest University release of Vaigai paddy, Co. 21 sorghum, Co. 6 pearl millet, EC. 4849 finger millet and Co. 2 onion are being tried in the different crop-sequences of the demonstrations. Minikit trials on the performance of a few hybrid, varieties and pre-release cultures of maize (EH. 2420, EH. 2380 Ganga 5, EH. 2310. Vijay, J. 305 J. 603, Ganga safed and V. L. 43), Radish (RS 13),

Ladies finger (Co. 1, Pusa savani and MC. 105) and sunflower (EC. 68413 and EC. 101495 are in progress. Co. 6 pearl millet was observed to be free from incidence of green ear as against 6.1 per cent of attack on HB 3 hybrid.

5. 5 Other Farmers Contact Programmes

5. 5 1. Farmers Day

The Farmers Day was celebrated on December 24, 1976 in the main campus. Shri N. Chikke Gowda, Minister for Agriculture, Karnataka delivered the Key note address. Thiru S. Narasimhan, I.A.S., Collector of Coimbatore, Thiru T. N. Palanisamy Gounder President, Thudiyalur Co operative Agricultural Services Society Limited, and Thiru V. Nanjappa Maniagar, Progressive farmer of Dharmapuri addressed the gathering. Dr. G. Rangaswami, Vice-Chancellor presided over the function. More than 3500 farmers from various districts visited the farm and took part in the discussion relating to the field problems faced by them.

The Farmers Day was also celebrated at Madurai Campus on January 31, 1977. More than 1000 farmers participated in the field visits and discussion session.

5. 5. 2. Field Day

Field Days were celebrated in 25 places in Madurai district and 1260 farmers attdnded.

5. 5. 3. Seed Sales Depots

The University seed sales Depots at Coimbatore, Madurai and other research stations distributed quality seeds of several improved crop varieties and potted plants and seedlings to the farmers. Books, booklets and bulletins on improved farm practices for different crops and on Animal Husbandry were also sold to the farmers.

The detailes of the quantities of seeds, number of potted plants and seedlings sold are furnished in Appendix V.

5. 5. 4. Enquiries answered

Question and problems received from the farmers of Tamil Nadu were answered and solutions given. Convincing answers were communicated to the farmers directly and through mass media like newspapers, journals etc., Besides, the University Communication Centre continued to assist the All India Radio, Coimbatore with answers for the questions of the farmers for broadcast for 14-20 minutes.

5. 5. 5. Release of information to the press

The resarch findings of the University Departments and Research Stations were processed and released by the Communication Centres as

popular articles in English and Tamil more than 200 addresses such as the news papers, journals, State Department officers, Fertilizer and pesticides firms, Co-operative Banks in the State for the benefit of the farming community in Tamil Nadu. The list of popular articles published in the year is given in Appendix VI.

5 5.6. **Release of Information to All India Radio**

The Communication Centre released news on the research findings and activities of the University through the Farm and Home Units of the All India Radio, Coimbatore and Tiruchirapalli for the benefit of farmers.

5 5.7. **Forecast of Pests and Diseases through All India Radio**

For the benefit of the farmers, forecasts of pests and diseases were broadcast twice a week, through All India Radio, Coimbatore and Tiruchirapalli. Suitable preventive and curative measures were also suggested.

5.5.8. **Farm School on the All India Radio**

A total number of 8-13 lessions with a duration of 12 – 15 minutes each on Modern Dairy Farming, Soil and Water Management, Cultivation of Tuber Crops, Dry Farming Practices, Banana Cultivation, Seed Technology in various crops were broadcast in the agricultural programmes on all Wednesdays in Coimbatore All India Radio and they were repeated on all sundays by All India Radio, Tiruchirapalli.

5 5.9. **Tamil Nadu Agricultural University Monthly Newsletter**

The monthly Newsletter was regularly published and copies sent to the Chancellor, Cabinet Ministers, Government Secretaries, Members of the Board of Management and other important persons and Agricultural Universities and Institutions closely connected with the University.

5 5.10. **Quarterly journal from the Tamil Nadu Agricultural University**

Tamil Nadu Agricultural University published four issues of the Tamil Quarterly journal 'Valarum Velanmai' for the benefit of farming community. The journal carries original, scientific articles on Agriculture, Animal Husbandry, Forestry, Fisheries and other allied subjects.

5.5.11. **Central Exhibition**

The Central Exhibition at the main campus was visited by 15,800 persons including several scientists, progressive farmers and V.I.P.s from Tamil Nadu and outside. Students and staff from different institutions of the State and outside visited the exhibition. The list of important visitors is given in Appendix I.

5.5.12. **Museum**

The Museum at the main campus of the University was visited by students from schools and colleges from Tamil Nadu and the neighbouring States. The Museum serves as the means of educating the public and school children in biology and agriculture.

5.5.13 **Artists and Photography Section**

The artists at main campus prepared large number of posters and charts, pen and ink drawings, etc. A large number of Photographs, enlargements, educational slides and other visual aids were prepared.

5.5.14 **University Press**

All the printing works of the Departments and Research Stations are being done in the University Off-set and Printing Press. The important items of work carried out in the Press are given in the Appendix III.

5.5.15. **Correspondence Course**

The Tamil Nadu Agricultural University imparted Correspondence Courses in the subjects of Flower Cultivation (twice), Modern Poultry Farming (twice), Sericulture (twice) Intensive Paddy Cultivation (twice,) Farm Implements, Dry Farming Methods, Cotton Cultivation, Banana Cultivation, (thrice) Millet Cultivation, Intensive Vegetable Cultivation, Modern Dairy Farming and Soil and Water Management. Totally 600 farmers were enlisted from different parts of the State for these courses during the year 1976-77. Three courses were offered every time with an interval of two months.

Training Programmes at Krishi Vigyan Kendra, Pondicherry

1. **Tractor Training** : A training for the I.T.I. qualified youths for a period of three months in driving and maintenance of tractor and power tiller was arranged with the financial assistance from Director of Industries, Pondicherry. A total of 33 candidates in four batches from Pondicherry and Karaikal underwent the training during this year.

2. **Fruits and Vegetable preservation and Nutrition requirements** : A training programme for three days for the Grama Sevikas and Mukhya Sevikas of the Pondicherry State was arranged in collaboration with the Food Technology Department of Tamil Nadu Agricultural University, Coimbatore. Eighteen candidates underwent the training.

3. **Training for Youths** : Twenty youths in two batches from Nehru Yuvak Kendra were given training on rice production and agricultural tools and power tiller for three days. A batch of 25 youths from Youth Mandals of Pondicherry region were given training for 2 days on rice and vegetable

and also on fish culture in ponds. A three day practical farm training on construction of ponds and growing fishes was conducted for a batch of 19 youths from Calve College, Pondicherry. The training was learning by doing.

4. **Functional Literacy Programme**: Ten teachers were trained on rice and vegetable production for three days under the functional literacy programme

5. **Associate women workers training programme**: Fifty women were given one day farm training on rice growing and kitchen gardening. Discussions were conducted on the nutritional requirements and nutritive foods.

6. **Intensive rice production courses**: Ten village level Workers were trained on the various intensive rice growing practices for a period of one month.

7. **Water Management Training**: A batch of five Extension Officers was imparted training for a period of 30 days on water management practices for rice, ragi and groundnut.

8. **Training Programmes for commissioners of Panchayat Union**: A two day programme for the benefit of Commissioners of Communes was conducted in Pondicherry and Karaikal on the latest methods of rice and vegetable production. Sixteen officers underwent this training programme.

9. **Kharif Programme on Rice Production**: In order to inform the farming people on the suitable rice varieties for *Kharif* season for increased production, programmes were arranged for four selected villages. A total of 150 farmers were benefitted by the programme.

10. **Pre-season Training Programme**: With a view to update the Agricultural Extension Officer on improved varieties of crop plants and production techniques, a pre-season training programme during *rabi* season for three days was organised in collaboration with the Department of Agriculture, Pondicherry. A total of 45 Extension Officers underwent the training.

11. **Fertilizer Campaign**: The importance of balanced fertilization for increasing the production of crop plants was informed to the ryots by arranging campaigns in five villages. A total of 200 farmers were benefitted by the campaign. This was done in collaboration with Madras Fertilizers Ltd.

12. **Vegetable Campaign**: Discussions with farmers were arranged in nine villages in order to promote the recent high yielding varieties of vegetables

and their production techniques for increasing the vegetable production in the Pondicherry regions. A total of 218 farmers were benefited by the Campaigns.

13. **Multiple cropping Training Programme** : Training Programmes on multiple cropping patterns suitable for Pondicherry region were organised in eight villages and 172 farmers were benefitted.

14. **Plant Protection Training** : Training programme were organised in three villages of major area on the plant protection measures on paddy to increase the rice production and 75 farmers were trained.

15. **Seminar and Discussions** : One Rice Seminar and five farmers discussion groups were organised in five villages and a total of 175 farmers were benefitted during *kharif* and *rabi* season.

16. **Farmer Conveners Meet** : Discussion and farm training were conducted for the farmers convener from Pondicherry region for 3 days on rice, pulses and vegetable production. At Karaikal two meetings were held one for *kharif* and the other for *rabi* for the benefit of conveners. Discussion on fish culture in ponds was also conducted for the first time at Karaikal. A programme was conducted at Karaikal high lighting the performance of rice Rajarajan (Co. 40).

17. **One day training Programmes** One day discussion cum demonstration meetings were conducted for the practising farmers on improved season specific rice varieties, vegetables, production methods and plant protection practices in 9 villages. A total of 205 farmers were benefitted. This programme was carried on in collaboration with the Farmers Training Centre, Pondicherry.

18. **Marginal Farmers and Agricultural Labours Agency** : One day practical training was given for 10 farmers of M. F. A. L. on growing of rice, two batches (22 farmers) belonging to two Irrigation Societies were also given training on water use and water management practices for rice and ragi and also on maintenance of pumpsets.

19. **Collaboration** : In addition, the Krishi Vigyan Kendra is collaborating with the Farmers Training Centre, Multiple Cropping Programme of Pondicherri State, Marginal Farmers and Agricultural Labourers Agency, Vector Control Research of Indian Council of Medical Research and Jawaharlal Institute of post Graduate Medical Education and Research for supply of seeds/planting materials for test growing and also by rendering technical advisory service. Regular Farm Advisory Work in Co-ordination with the Project Agricultural Officer, Pondicherry is undertaken. Technical help in conducting adaptive trials and also in laying demonstration trials on varieties and improved practices is regularly extended to the different units of the Department of Agriculture, Pondicherry.

7)	M/s I.C.M.F Cotton, Bombay	Scheme for evolution of high yielding, short duration, medium staple varieties of cotton at Kaveripattinam
8)	M/s. South India Viscose Ltd., Mettupalayam	Tree Improvement Project
9)	M/s. Seshasayee Paper and Boards Limited, Erode	Tree Improvement Project
10)	Ford Foundation	Development of Rural Social Science
11)	UNICEF, New Delhi	Staff support for University Departments (Teaching on Human Nutrition)
12)	U.G.C., New Delhi	The pattern of consumption, savings and investments in Agriculture

Scholarships: The scholarships offered by the following organisations were accepted.

	Name of Donor	Amount	Purpose
1)	M/s. Bharat Pulverising Mills (P) Ltd., Madras	10,000/-	Award of a scholarship to M. Sc. (Ag.) student in Entomology
2)	M/s. Southern Borax Ltd., Madras.	10,000/-	Award of scholarship to M. Sc. (Ag.) student in Soil Science and Agricultural Chemistry
3)	M/s Ciba-Geigy, Bombay	6,000/-	Award of a scholarship to M. Sc. (Ag.) student in Agricultural Entomology
4)	M/s. Pyrites, Phosphates and Chemicals Ltd., Dehra Dun	10,000/-	Award of a scholarship to M. Sc (Ag.) student in Soil Science and Agricultural Chemistry
5)	M/s. Indian Potash Ltd., Madras	5,000/-	Award of a scholarship to M. Sc. (Ag.) student in Agronomy

Prizes: The following endowments were created for institution of medals during 1976-77.

	Name of the Donor	Endowment	Amount	Remarks
1)	Bank of Madurai Ltd., Coimbatore	Chairman Karumuthu Thiyagarajan Chettiar Medal	10,000/-	Award of medal to the best Ph. D. student of the University
2)	T. N. A. U., Coimbatore	Jagjivan Ram Medal	10,000/-	Award of medal to the best M.Sc. (Ag.) student in Agricultural Extension

3)	M/s. Sandoz India Ltd., Bombay	Nathaniel Memorial Gold Medal	10,000	Award of medal to the best Ph. D student in plant Protection and Weed Control
4)	Thiru K. C. Chandy, Aduthurai	K. E. Chacko Medal	1,000/-	Award of medal to the B. Sc. (Ag.) student who obtains highest grades in Agricultural Entomology
5)	Thiru W. P. A. R. Nagarajan of Pattiveeranpatti	W.P.A.R. Nagarajan of Pattiveeranpatti Medal	2,500/-	Award of medal to the B. Sc. (Hort.) student who obtains highest grades in plantation crops
6)	Thiru G. Thulasidos, Coimbatore	Sathiavan Gopala Pillai Medal	1,000/-	Award of medal to the B. Sc. (Ag.) student who obtains the highest marks in Plant Breeding
7)	I. S. A. E., New Delhi	MAAE. Medal	1,500/-	Award of medal to the B. E. (Ag.) student who obtains the highest grades in Agricultural Structures
8)	Prof. G. R. Damodaran, Coimbatore	G. R. Varadaraju Memorial Medal	5,000/-	Award of medal to the best B. E. (Ag.) student of the University
9)	Proprietor, Elseetee Industries Coimbatore and the Staff of College of Agricultural Engineering, Coimbatore	B.M. Lakshmipathy Medal	2,500/-	Award of medal to the B. E. (Ag.) student who obtains the highest grades in Agricultural Processing
10)	M/s. Premier Irrigation Equipments (P) Ltd., Bangalore	Premier Irrigation Medal	2,500/-	Award of medal to the B. E. (Ag.) student who obtains the highest grades in Soil and Water Conservation
11)	M/s. Associated Agencies, Ootacamund	Associated Agencies Medal	2,500/-	Award of medal to the B. E. (Ag.) student who obtains highest grades in Farm Machinery

Grants-in-aid: Grant or subscription was paid to the following institutions during 1976-77.

		Rs.
i)	Staff club, Coimbatore Campus	7,600.00
ii)	Ladies club, Coimbatore Campus	800.00

7) M/s I.C.M.F Cotton, Bombay	Scheme for evolution of high yielding, short duration, medium staple varieties of cotton at Kaveripattinam
8) M/s. South India Viscose Ltd., Mettupalayam	Tree Improvement Project
9) M/s. Seshasayee Paper and Boards Limited, Erode	Tree Improvement Project
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3) M/s Ciba-Geigy, Bombay	6,000/-	Award of a scholarship to M. Sc. (Ag.) student in Agricultural Entomology
4) M/s. Pyrites, Phosphates and Chemicals Ltd., Dehra Dun	10,000/-	Award of a scholarship to M. Sc (Ag.) student in Soil Science and Agricultural Chemistry
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6	Thiru G. Thulasidos, Coimbatore	Sathiavan Gopala Pillai Medal	1,000/-	Award of medal to the B. Sc. (Ag.) student who obtains the highest marks in Plant Breeding
7)	I. S. A. E., New Delhi	MAAE, Medal	1 500/-	Award of medal to the B. E. (Ag.) student who obtains the highest grades in Agricultural Structures
8)	Prof. G. R. Damodaran, Coimbatore	G. R. Varadaraju Memorial Medal	5,000/-	Award of medal to the best B. E. (Ag.) student of the University
9)	Proprietor, Elseetee Industries Coimbatore and the Staff of College of Agricultural Engineering, Coimbatore	B.M. Lakshmipathy Medal	2,500/-	Award of medal to the B. E. (Ag.) student who obtains the highest grades in Agricultural Processing
10)	M/s. Premier Irrigation Equipments (P) Ltd., Bangalore	Premier Irrigation Medal	2,500/-	Award of medal to the B. E. (Ag.) student who obtains the highest grades in Soil and Water Conservation
11)	M/s. Associated Agencies, Ootacamund	Associated Agencies Medal	2,500/-	Award of medal to the B. E. (Ag.) student who obtains highest grades in Farm Machinery

Grants-in-aid: Grant or subscription was paid to the following institutions during 1976-77.

		Rs.
i)	Staff club, Coimbatore Campus	7,500.00
ii)	Ladies club, Coimbatore Campus	800.00

iii)	Madras Agricultural Students' Union Coimbatore	4,000.00
iv)	Indian Agricultural Universities Association, New Delhi	3,000.00
v)	Ulavar Thunaivan, Madurai	3,000.00
vi)	Association of Indian Universities	4,500.00
vii)	Institute of Techno-economic Studies, Madras	100.00
viii)	Current Science Association, Bangalore	500.00
ix)	Southern Languages Book Trust, Madras	5,000.00
x)	Annual donation of Tamil Nadu Academy of Sciences, Director of Technical Education Madras	5,000.00
xi)	Ad-hoc grant to International Symposium on Coconut Research and Development, Kasaragod	5,000.00

University budget for 1977-78 : The annual financial estimates of the TNAU have been approved by the Finance Committee and the Board of Management for a gross appropriation of 571.84 lakhs (including ICAR, G. O. I. and other agencies)

A sum of Rs. 333.77 lakhs is expected as grant from the State Government for the University in 1977-78 for implementing various education and research programmes and extension work. Grants from ICAR will be about Rs. 158.54 lakhs including Development Grant. Other University receipts will be in the order of Rs. 50.0 lakhs approximately.

Audit : The audit certificates for 1974-75 have been sent to the ICAR and G. O. I. for almost all the schemes sponsored by them.

The audit of account upto and 1975-76 has been completed. The general result of audit is satisfactory.

APPENDIX 1

LIST OF IMPORTANT VISITORS TO THE TAMIL NADU AGRICULTURAL UNIVERSITY, COIMBATORE

Dr R K. Agarwal, Assistant Director, Himachal Pradesh Agricultural University, Simla

Thiru A Akbar Shah, I.F.S., Deputy Conservator of Forests, Bangalore, Karnataka State

Dr. Allen G Noble, Professor of Geography, University of Akron, Akron, Ohio

Dr. L. S Alles, Project Director, Minor Crops Export Research Project, Matale, Sri Lanka

Dr H. O. Amin, Professor of Horticulture, Agricultural University, Gujarat

Prof. Amlan Datta, Vice-Chancellor, North Bengal University, Rajarammohanpur, West Bengal

Dr Amrik Singh, Secretary, Association of Indian Universities, New Delhi

Thiru S. E Anantharaman, Retired Chief Engineer (Agricultural Department), Madras

Thiru O. B. Anbrivi, New Delhi, C/o MALCO, Italy

Thiru Anjini Kumar, Deputy Secretary, Association of Indian Universities, New Delhi

Thiru Anil Bordia, Joint Secretary, Ministry of Education, New Delhi

Tmt. Anne Broaddus, 623, Lakestone Drive, North Carolina, United States of America

Dr. A. Appa Rao, Director of Research, Andhra Pradesh Agricultural University, Hyderabad

Thiru M. R. Appa Row Vice-Chancellor, Andhra University, Visakhapattinam

Thiru U. R. Appa Rao, Vice-Chancellor, Andhra Pradesh University Waltair

Dr. H. R. Arakeri, Vice-Chancellor, University of Agricultural Sciences, Bangalore

Thiru B. Arul Prakasam, I. F. S., Forest Geneticist, Coimbatore

Dr. D. Aspinall Waite, Agricultural Research Institute, University of Adelaide, South Australia

Dr. A. S. Atwal, Dean (Ag) College of Agriculture, Punjab Agricultural University, Ludhiana

Dr. V. A. Azuba Krasnodar, All Union Rice Research Institute, U.S.S.R.

Dr. M. B. Badenhoop, Professor, Department of Agricultural Economics University of Tennessee, United States of America

Dr. J. C. Bakshi, Director of Research, Punjab Agricultural University, Ludhiana

Dr. Bakshi, Head, Division of Biology, Forest Research Institute and Colleges, Dehra Dun, Uttar Pradesh

Thiru A. K. D. Balarama Raja, Extension Council Member, Rajapalayam

Thiru V. Balasubramanian, Director, Sericulture, Karnataka

Dr. V Baliah, Vice-Chancellor, Nagarjuna University, Chandramouli Nagar, Guntur

Dr. S. P. Banerjee Registrar, Calcutta University, Calcutta

Thiru K. J. C. Bose, I.F S., State Silviculturist Andhra Pradesh

Prof. A. N. Bose, Vice-Chancellor, Jadavpur University, Calcutta, West Bengal

Prof. A. N. Bose, NCERT, New Delhi

Dr. H. Bareh, Reader, North Eastern Hill University, Shillong, Assam

Dr H. K. Baruah. Vice Chancellor Gauhati University, Gauhati, Assam

Thiru Baweja Chief Hydrologist, Central Groundwater Board, New Delhi

Dr. Bernard F. Stanton, Professor of Agricultural Economics, Cornell University, United States of America

Thiru Bhakt Darshan, Vice-Chancellor, Kanpur University, Kalyanpur, Kanpur

Prof. B. Bhattia, Dean, School of Environmental Science, Jawaharlal Nehru University, New Delhi

Dr. D. R Bhumbla, Deputy Director General, ICAR, New Delhi

Dr. Bistan Singh, Vice-Chancellor, Guru Nanak University, Punjab

Dr N. Bogdamova, Scientist, U.S.S.R.

Dr. H. Bruchholz, Agronomist, German Democratic Republic, Germany

Dr Bum Suk Lee, Korean Ambassador, Chanakyapuri, New Delhi

Thiru Chacko Central Ground Water Board, Coimbatore

Thiru M. Chakravarthy, Member ICAR Visiting Team, M. S. University Baroda

Thiru S. N. Chakravarthy, Registrar, University of Kalyani, West Bengal

Dr. Chancellor, U. N. D. P., California

Dr. Chandran D. S. Devanesan, Vice-Chancellor, North Eastern Hill University, Shillong, Assam

Thiru Chandrashwar Prasad Dean, Students' Welfare, Magadh University, Bodhgaya, Bihar

Dr S. Chandrasekar, Vice-Chancellor, Annamalai University, Chidambaram

Dr. A L.Chaudhry, Professor, Department of Animal Science (Research and General), College of Veterinary and Animal Sciences, Bikaner (Udaipur University)

Thiru A. K. Chaudhuri, Finance Officer, University of Burdwan, Burdwan, West Bengal

Dr A. N Chakraborthy Professor and Head, Department of Gynaecology, Bidhan Chandra Krishi Viswa Vidyalaya, Calcutta

Thiru S V. Chavan, Vice-Chancellor, Konkan Krishi Vidyapeeth, Dapoli, Maharashtra

Thiru G. V Chellappa, State Marketing Manager, IFFCO, Hyderabad

Dr. A. S. Cheema, Vice-Chancellor, Punjab Agricultural University, Punjab

Dr S. S Cheema, Department of Horticulture, Punjab Agricultural University, Ludhiana

Thiru Channa Basaviah, Coordinator, National Demonstration Scheme, Bangalore

Dr. V V. Chinulu, Dean (P. G School) IARI, New Delhi

Thiru R. K Chhabra, Secretary, University Grants Commission, New Delhi

Thiru N Chikke Gowda, Minister for Agriculture, Karnataka State

Thiru S V Chittibabu Vice Chancellor, Madurai University Madurai

Thiru R K. Choudry, Chief Training Officer, Indian Farmers Fertilizer co-operative Limited, New Delhi

Dr Constance A. Jones, Professor, Department of Sociology, Agnes Scott College, Georgia, U S A.

Dr D. A Dalekolkar, Vice Chancellor, University of Poona, Poona

Thiru Dabral I. F. S., State Silviculturist, Maharashtra

Dr. J. Das, Vice-Chanceller, Orissa University of Agriculture and Technology Bhubaneshwar

Thiru Das, Vice-Chancellor, Assam

Dr. A D. Dave, Dean (Veterinary), Veterinary College, Anand

Thiru C C. David, Special Officer, North Eastern Hill University, Shillong Assam

Thiru David Jalapona, Agricultural Officer (Engineering), Tanzania

Dr. Davydoss, All Union Rice Research Institute, U. S. S. R

Dr P. Dayal, Vice-Chancellor, Magadu University, Bodh-Gaya, Bihar

Thiru Dekhane, Dryland Farm Officer, Maharashtra

Dr. P. G Deo, Vice-Chancellor, University of Indore, Indore, Madhya Pradesh

Thiru Deodhas, Associate Dean, Bombay Veterinary College, Bombay

Dr. C R. De Kimpe, Soil Scientist, Department of Agriculture, Canada

Thiru A. R Desai, Vice-Chancellor, South Gujarat University, Surat, Gujarat

Thiru D M. Desai, Vice-Chancellor, Gujarat Vidyapeeth, Ahemadabad

Dr. A. K Dhan, Vice-Chancellor, Ranchi University, Ranchi, Bihar

Dr. Mrs. Dheshi, Head, Home Science Department, Punjab Agricultural University, Ludhiana

Thiru J. C Dikshit, Vice-Chancellor, Ravi Sankar University, Raipur, Madhya Pradesh

Thiru Durga Prasad Nayak, Programme Director, N. S. S. Sambalpur, Burla

Dr S. K. Dutta, Vice-Chancellor, B N Chakravarthy University, Kurukshetra, Haryana

Thiru S. C. Dutta, Secretary, A. I. U. C. E., New Delhi

Thiru Dryden, Canadian Expert, Dryland Research Station, Hyderabad

Dr. Earl M Neel, Professor, Department of Geography, University of Arkansas, Arkansas, U.S.A.

Thiru Edward HA Sudungam Pasaribu, Agronomist, Research Institute of Tea and Cinchona, Indonesia

Dr Eugene P. Wenninger, Director, Urban Regionalism Kent State University, Ohio, U.S.A.

Tmt. Evelyn P Simmons, Professor, Department of Economics, Meredith College, North Carolina, U. S. A.

Dr. D. Falarlh, Department of Economics, New York, U.S.A.

Thiru. Forgen Moesgard, Danish Agriculturist, Bhavani

Dr. Francis G H Lavston, Plant Breeding Institute, Cambridge

Dr. Fredrick G Fliegel, Visiting Professor, Illinois University, U.S.A.

Thiru. P. N. Ganapathy, I.F.S., Director, Kerala Forest Research Institute, Trichur

Prof. Gantan Mathur, Vice-Chancellor, Utkal University, Bhubaneshwar, Orissa

Dr O P. Gautam, Dean (Veterinary), Haryana Agricultural University, Hissar

Dr O. P. Gautam, Deputy Director General (Education), ICAR, Krishi Bhavan, New Delhi

Thiru F V. K. C. George, Professor and Head of the Department of Rural Development Sciences, Madurai

Thiru A. C. George, Minister of State Civil supplies, Government of India, New Delhi

Dr. B. P Ghildyal, Dean (Ag.) College of Agriculture, G B. Pant University, Pantnagar

Tmt. Gisele W Kholer Professor of Psychology, Atlantic College, Georgia, U.S.A.

Dr. D. Y. Gohokar, Vice-Chancellor, Nagpur University, Nagpur Madhya Pradesh

Dr. C. P. Ghonsikar, Associate Dean (Home Science), Maratwada Agricultural University, Parbhani

Commander K. P. Gopal Rao, M. V. C. VSM, Director of NCC (T. N. & P), Coimbatore

Dr. R. Gopalakrishnan, Director of Research, Kerala Agricultural University, Mannuthi

Prof. S. C. Goyal, Vice-Chancellor, Jodhpur University, Jodhpur

Dr. R. Grigorova, Institute of Microbiology, K. V. Geo Milev, Sofia 13 - Bulgaria

Dr. Gulab Chand Jain, Vice-Chancellor, Indira Kala Saggot, Vishwa Vidyalaya Khaigararh, Madhya Pradesh

Thiru Gulam Muhammed, Director, Institute of Correspondence Course University of Kashmir, Srinagar

Thiru Gupta, Deputy Commissioner (Soil), Ministry of Agriculture, New Delhi

Thiru A. K. Gupta, Registrar, Jadavpur University, Calcutta

Dr D. S Gupta Dean (Ag.), Haryana Agricultural University, Hissar

Prof. Gurbakhsh Singh, Vice-Chancellor, University of Hyderabad, Hyderabad, Andhra Pradesh

Dr. P. D. Hajela, Vice-Chancellor, University of Allahabad, Allahabad

Dr. Hans Birswanger, Associate of the Agricultural Department Council ICRISAT, Hyderabad

Thiru K. Hanumantha Rao, Project Officer, Small Farmers' Development Agency, Madurai

Dr D. H. Hapra, Sugarcane Specialist, Padegoan, Maharashtra

Dr. J. B Harlan, Professor of Genetics, University of Illinois, U.S A

Prof. Harsuthbhai S. Sanghvi, Vice-Chancellor, Saurashtra University, Rajkot, Gujarat

Dr. Harvey G. Kebsehull, Professor, Department of Politics, North Carolina, U.S A

Thiru T. N. Hazela, Deputy Secretary, University Grants Commission, New Delhi

Dr. R. C. Hiremath, Vice-Chancellor, Karnataka University, Dharwar-3, Karnataka

Dr. V. M. Ingle, Associate Dean (Ag Tech) and Principal, Marathwada Agricultural University, Parbhani

Thiru. H. Ikehashi, I.R.R.I., Manila, Phillipines

Dr. Ishwar Prakash, Coordinator, National Programme for Rodent Pest Management Control, Arid Zone Research Institute, Jodhpur, Rajasthan

Thiru Ishwarbhai J. Patel, Vice-Chancellor, Gujarat University, Ahmedabad

Thiru Jagdish Prakash, Assistant Education Officer, Ministry of Education, New Delhi

Thiru J. A. Jalihal, Director of Extension, University of Agricultural Sciences, Bangalore

Dr. Jambunathan, Biochemist, ICRISAT, Hyderabad

Dr. P. S. B. R. James, Professor, Fishery Biology, College of Fisheries, Mangalore

Dr. James D. Henderson, Professor, Department of History, Grambling State University, Louisiana, U.S.A.

Prof. James Herlofson, Director, International Foundation for Sciences, Stockholm, Sweden

Dr. Jeebala Rao, Director, Post Graduate School, Jawaharlal Nehru Technical University, Hyderabad, Andhra Pradesh

Thiru T. Jeydev, I.F.S., Chief Conservator of Forest (Development) Tamil Nadu

Dr. A. Jha, Senior Mycologist, Pusa, Bihar

Dr. B. S. Jogi, Vice-Chancellor, Himachal Pradesh University, Simla, Himachal Pradesh

Thiru John Evans, Ohio University, U.S.A.

Thiru John H. Kohler III Professor, History Department, Atlantic College, Georgia, U.S.A.

Dr. John W. Stafford, Professor, Department of Geography, Florida, U.S.A.

Dr. S. Jones, Retired Director, Central Marine Fisheries Institute, Mandapam Camp

Thiru Joseph Wioth, Mechanical Engineer, Tanzania

Dr. H. O. Joshi, Professor of Plant Pathology, Agricultural University, Gujarat

Thiru S. T. Kachwa, Registrar, Marathwada Agricultural University, Parbhani, Maharashtra

Dr. A. S. Kaikini, Dean (Veterinary), Punjabrao Krishi Vidyapeeth, Akola

Thiru R. G. Kakade, Servants of India Society, Madras

Dr. V. R. Kale, Associate Dean (Research), M. P. Krishi Vidyapeeth, Rahuri

Thiru N. Kaleeswaran, I.A.S., Vice-Chancellor, Kerala Agricultural University, Vellayani, Kerala

Tmt. Kamalini H. Bhansali, Registrar, Shreemathi Nitimbai Damodar Thackersey Women's University, Bombay

Dr. M. V. Kanjaria, Dean (Ag.), College of Agriculture, Junagadh

Dr. S. P. Kapur, Virus Pathologist, Punjab Agricultural University, Ludhiana

Thiru L. N. Kar, Information Specialist, Orissa University of Agriculture and Technology, Bhubaneshwar

Tmt. Kathleen M. Massaro, Professor of Economics, Lemeyne College, Syracuse, New York, U.S.A.

Dr. K. N. Kaul, Vice-Chancellor, Chandrashekar Azad University of Agricultural Technology, Kanpur

Dr. R. L. Kaushal, Vice-Chancellor, J.N.K.V. Vidyalaya, Jabalpur

Dr. Kemmler, International Potash Institute, Bern, Germany

Dr. S. S. Khanna, Director of Extension Education, Haryana Agricultural University, Hissar

Dr. G. S. Khush, Plant Breeder, I.R.R.I., Manila - Phillipines

Thiru A. M. Khusro, Vice-Chancellor, Aligarh Muslim University, Aligarh

Dr. V. S. Khuspe, Vice-Chancellor, Marathwada Agricultural University, Parbhani, Maharashtra

Dr. C. D. E. Kimpe, Agriculturist-Quebec, Canada

Dr. Kirti Singh, Dean (Ag.), Narendra Rao, University of Agriculture and Technology, Faizabad

Dr. A. V. R. G. Krishnamurthy, I.F.S., Conservator of Forests (Research and Development), Andhra Pradesh

Dr. R. S. Krishnan, Vice-Chancellor, University of Kerala, Trivandrum

Dr. C. Krishna Rao, Vice-Chancellor, Andhra Pradesh Agricultural University, Hyderabad

Thiru S. Krishnaswamy, Station Director, All India Radio, Tiruchirapalli

Thiru S Krishnaswamy, Central Sericultural Research and Technology Institute, Mysore

Thiru Krishnaswamy Gounder, Ex M. L. A., Coimbatore

Thiru Kuipers, UNESCO Expert, Netherlands

Thiru D. P. Kukde, Nagpur University, Nagpur

Miss Kumul Joshi, Member of Parliament, Gujarat

Dr. P. S. Lamba, Vice-Chancellor, University of Udaipur, Udaipur

Tmt. Lalitha Kumar, I. A. S., Assistant Collector Thanjavur

Dr. Lare Brink, Department of Agricultural Economics, Purdue University, Indiana, U.S.A.

Dr Leigh H. Hammond, Assistant Vice-Chancellor for Extension and Public Service, N. Carolina, U. S. A.

Thiru Lewisk Michocho, University of Malawi Bunda, College of Agriculture, Malawi

Prof. Louis Malawi, College of Agriculture, Malawi

Thiru W A D. Lucas, Farm Manager Agricultural Station, Abbepuram, Colombo

Prof. P. J. Madan, Vice-Chancellor, Maharaja Sayaji Rao University of Baroda, Baroda, Gujarat

Dr. P. Madhava Menon, Director, Directorate of Millets, Madras

Dr (Tmt.) Madhuri Shah, Vice-Chancellor, Shreemati Nathinbai Damodar Thackersey Women's University, Bombay

Thiru H. B. Magal, U. S. Educational Foundation in India, 12, Hailey Road, New Delhi

Thiru V.K. Mahajan, Registrar, M.P. Krishi Vidyapeeth, Rahuri (Maharashtra)

Dr Mahavir M. Joshi, Gujarat Agricultural University, Ahmedabad

Dr. (Miss) Malathi Chakravarthi, Director (i/c) Continuing Education, Maharaja Sayaji Rao University of Baroda, Gujarat

Dr. Malcolm Adiseshaiah, Vice-Chancellor, University of Madras, Madras

Dr. K. K. Mandal, Vice-Chancellor, University of Bihar, Muzaffarpur, Bihar

Thiru J. Mallikarjun, Programme Officer, Indian Universities Association, New Delhi

Thiru Mallikarjunappa, Director, Institute of Correspondence Course and Continuing Education, Mysore University, Mysore

Dr. Marion J. Rice, Head of the Department of Social Science Education, University of Georgia, Athens, Georgia.

Thiru Martanto Martosupono, Plant Physiologist, Research Institute of Tea and Cinchona, Indonesia

Prof. V.S. Mathur, Head, Department of Education and Director of Correspondence Course, A.P. University, Simla, Himachal Pradesh

Thiru. H.N. Mathur, I.F.S., Conservator of Forests, Environmental Research Station, Dehra Dun

Dr. A.M. Mazumdhar, Gujarat Agricultural University, Ahmedabad

Dr. K. Meeda, Assistant Professor (Crop Science), Kochi University, Japan

Thiru K.K. Mehrishi, Director, School of Basic Sciences and Humanities, University of Udaipur

Dr. H.N. Mehrotra, Dean (Ag.), Rajasthan College of Agriculture, Udaipur

Dr V.R Mehta, Vice-Chancellor, Gujarat Agricultural University, Ahmedabad

Dr. Melford A Wilson, Professor, Department of Political Science, Winthrop, College of South Carolina, U S A

Thiru S.S. Melligiri, M.L.C. Karnataka

Thiru A.H. Mandari, Deputy Minister Government of Maharashtra, Bombay

Dr Mir Hamid Ali, Dean (Ag.), Andhra Pradesh Agricultural University, Hyderabad

Dr. D.C. Misra, Vice-Chancellor, Sambalpur University, Burla, Orissa

Dr. Misra, Vice-Chancellor, L.N. Mishra University, Dharbanga, Bihar

Dr. P.H. Mistry, Dean (Basic Science), Gujarat Agricultural University, Dafnala, Shahibag, Ahmedabad

Dr. Modgal, Head, Department of Agronomy, Himachal Pradesh Agricultural University, Simla

Dr. Mohamad Isa, Research Institute for Tea and Cinchona, Indonesia

Thiru Mohammed Bahadur Ali, Nehru Youth Khendra, Karimnagar, Andhra Pradesh

Hon. Thiru Mohanlal Sukhadia, Governor of Tamil Nadu

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Thiru R. V. Subrahmanian, Adviser to the Governor of Tamil Nadu

APPENDIX II

LIST OF SCHEMES FINANCED BY THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH AND OTHER AGENCIES

	Name of the Scheme	Location	Date of Implementation	Total cost 1976-77 Rs.
	1	2	3	4

I. Financed by the I.C.A.R.

Department of Agronomy

	Name of the Scheme	Location	Date of Implementation	Total cost 1976-77 Rs.
1	Integrated Co-ordinated Scheme for studies on Salinity and Water Management	Bhavanisagar Madurai	IV Plan 1.4.74 to 31.3.79	1,97,100 2,03,300
2.	Co-ordinated Agronomic Experiments Scheme-Staff at Headquarters	Coimbatore		1,00,400
3	Co-ordinated Scheme for Model Agronomic Experiments at Selected Centres	Bhavanisagar		58,400
4.	Co-ordinated Dryland Agricultural Research Project	Kovilpatti		2,66,428
5.	Co-ordinated Wheat Improvement Project	Coimbatore	1.10.75 to 31.3.79	61,300
6.	Co-ordinated Research Improvement Project (Sugarcane)	Cuddalore		55,000
7	Scheme for Research on feasibility of introducing mixed farming with a view to increase income and employment of small, medium and large scale farmers of backward areas of Tamil Nadu	Kaveripattinam Yercaud	27.2.76 to 31.12.80	89,865 82,700

Department of Agricultural Botany

	Name of the Scheme	Location	Date of Implementation	Total cost 1976-77 Rs.
8.	Co-ordinated Research Project on Oilseeds-Integrated Centre at Coimbatore (Combined) (i) Strengthening of Research on Sunflower; (ii) Scheme for establishment of Cytogenetical and Physiological studies on groundnut; (iii) Strengthening of Research work on groundnut Physiology and Virus Units; iv) Main Centre for Sesamum; (v) Strengthening of Research work on Safflower and Niger, (vi) Work on groundnut	Coimbatore	1-4-74 to 31-3-79	6,16,530

1		2	3	4
9.	Co-ordinated Research Project on Oil-seeds			
	Off-Season Nursery Project	Pollachi	1-4-74 to 31-3-79	1,38,400
	Sub-Centre for Groundnut	..	..	74,470
	Main Centre for Groundnut	*Tindivanam*	..	2,16,735
	Castor Research Station	Salem	..	80,090
10.	Co ordinated Rice Improvement Project	Coimbatore		1,92,300
		Madurai		17,700
		Aduthurai		1,86,700
11.	Co-ordinated Millet Improvement Project	Coimbatore		1,21,800
12.	Co-ordinated Sorghum Improvement Project	Coimbatore	..	2,43,700
13.	Co-ordinated Research Project on	Coimbatore	..	1,85,900
	Cotton Breeding and Agronomy	Srivilliputhur	..	1,91,160
	Cotton Zonal Coordinator	Kovilpatti	..	89,098
	Centre	Coimbatore	.	9,200
14.	Co ordinated Project on Jute and allied fibres-Scheme to evolve superior varieties of Jute, Mesta, Sunnhemp for cultivation in Tamil Nadu	Coimbatore	..	51 720
15.	Co-ordinated Pulses Improvement Project-Scheme for Improvement of Pulses in Tamil Nadu	Coimbatore	..	3,10,720
		Madurai	..	3,12,700
16.	Scheme for Production of Nucleus seeds of recently developed groundnut varieties POL. 1, POL. 2 and TMV. 10 :	Bhavanisagar	1-6-74 (three years)	12,900
		Tindivanam	..	12,461
17.	Coordinated Coconut and Arecanut Development Project	Veppankulam	1-4-74 to 31-3-79	1,30,036
18.	Project on Production of Elite and Super Elite Sunflower Seed	Bhavanisagar	1-12-76	5,52,290

Department of Forage Crops

19.	Coordinated Project for Research on Forage Crops	Coimbatore	1-4-74 to 31-3-79	85,835

Agricultural Entomology

20.	*Scheme on Nematode control in Fruits.* Vegetables and other Field crops	*Coimbatore*	Closed on 31-12-76	42,000
21.	Scheme on Bionomics and control of the Mango Stemborer (*Bactocera rufomaculata*)	Coimbatore	1-10-73 30-9-74	22,224

	1	2	3	4
22.	Introduction of exotic natural enemies for possible biological control of *Parthenium hysterophorus* and *Solanum elaeagnifolium*	Coimbatore	Closed on 2-11-76	
23.	Studies on the Biological control of the coconut Black Headed Caterpillar *Nephantis serinopa* and studies on Biological control of the apple woolly aphid	Vaniyambadi and Kodaikanal	1-7-76 (for three years)	40,350

Department of Horticulture

24.	Co-ordinated Vegetable Improvement Project	Coimbatore	1.4.74 to 31.4.79	71,107
		Kovilpatti	..	36,900
25.	Scheme for Intensification of Research on Development of Roses and Jasmine varieties with high essential oil contents.	Coimbatore	21.6.72 to 20.6.77	50,280
26.	Co-ordinated Project for Improvement Tuber Crops (other than potato)	..	1.4.74 to 31.3.79	62,700
27.	Co-ordinated Research Improvement Project (Coconut and Arecanut Improvement in Tamil Nadu)	..		21,780
28.	Co-ordinated Spices and Cashewnut Improvement Project	Vriddhachalam	..	56,024
	-do- (Minor Spices)	Coimbatore		44,900
29.	Co-ordinated Research Project for Medicinal and Aromatic plants	Kodaikanal	..	1,62,592
30.	Scheme for Research on Temperate Vegetables	Coimbatore	1.7.75 to 30.6.77	42,540
		Kodaikanal	..	38,640
31.	Co-ordinated Fruit Improvement Project	Coimbatore	1.4.74 to 31.3.79	2,97,698
		Periakulam	7.8.75	1,21,620
32.	Scheme for Research on some selected fruits in semiarid areas in India	Yercaud	1.7.76 30.3.80	39,768
33.	Scheme for Demonstration of minikit trials in cashew under Cashew Development Programme..	Vriddhachalam	10.9.76 to 9.9.78	8,850

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Department of Agrl. Engineering				
34	Co-ordinated Scheme for Research and Development of production of prototypes and their evaluation under different agro-climatic conditions. (Zonal Research and Prototype)	Coimbatore	1.4.74 to 31.3.79	4,01,251
35	Scheme for Energy requirements for Agricultural Production Programme	..	..	94,424
36	Scheme for studies on Harvest and Post-harvest Technology	..	..	95,812
37.	Project of Technical Co-operation between the IDRC Canada and the ICAR New Delhi on Post Harvest Technology		1.9.75 to 31.8.79	1,01,870
38.	Drip Irrigation Scheme for water scarcity area		27.4.76 to 31.3.79	23,760
Department of Agricultural Economics				
39	Central Sector Scheme for drought prone areas programme, agro-economic Research and Pasture Research under the World Bank Programme for DPAP	Kovilpatti	24-10-75 to 31-12-79	66,170
40	Farm Management research for planning Agricultural Development in the Hills of Tamil Nadu	Coonoor	1-5-76	92,145
Department of Extension Education				
41.	National Demonstration on Major Food Crops	Madurai	1-4-74 to 31-3-79	2,16,666
Department of Seed Technology				
42	Scheme for Research on Seed Technology	Coimbatore	1-6-73 to 3-7-78	65,412
Department of Soil Science and Agrl. Chemistry				
43	Co-ordinated Scheme for Improvement of Soil Physical Conditions to increase Agricultural Production	Coimbatore	1-4-74 to 31-3-79	72,933
44	Co-ordinated Programme on Assessment of the effects of fertilizer use and pest management on changing environments under intensive cropping (Long Term Fertiliser)	Coimbatore	1-4-74 to 31-3-79	17,252

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45. Co-ordinated Scheme on Micronutrients of soils	Coimbatore	1.4.74 to 31.3.79	1.36.370
46. Co-ordinated Scheme of investigation on correlation of Soil Test with crop responses	Coimbatore	1.4.74 to 31.3.79	70.323
47. Pilot Project for training personnel for a cadre of self employed rural Soil Health Care Workers	Madurai	1.6.76	85.500
Department of Plant Pathology			
48. Co-ordinated Research Improvement Project (Coconut Wilt Diseases)	Muthupet	1.4.74 to 31.3.79	57.924
Department of Biology			
49. Adhoc Scheme entitled 'Studies on interaction between the *Rhizobia* and pesticides applied to seed and soil'	Coimbatore	15.4.76 to 14.4.78	27.753
Department of Fisheries			
50. Co-ordinated Research Project on Composite culture of Indian and Exotic Fishes and Fish Seed Production	Coimbatore	1.10.75 to 30.9.79	68.310
I. I.C.A.R. Scheme outside the Tamil Nadu State:			
Agricultural Polytechnic	Pondicherry	25.3.74	4.00.000
II. Government of India Scheme:			
1. Department of Agricultural Economics			
Comprehensive Scheme on cost of cultivation of principal crops	Coimbatore	1.4.74 to 31.3.79	3.38.900
2. Department of Agricultural Extension			
Farmers' Training Centre	Coimbatore	1.4.74 to 31.3.79	1.19.000
Farmers' Training Centre	Madurai	..	1.19.000
3. Department of Agricultural Entomology			
On use of native viral and fungal pathogens in pest control and their safety to beneficial insects and vertebrates	,,	27.8.76	18.000
4. Department of Biology			
Investigation on the recycling of effluents from sago factories.	Coimbatore	23.3.76 to 22.3.79	1.52.000

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5. Department of Food Technology			
Survey for the presence of mycotoxins with special reference to Patulin etc.	Coimbatore	1.8.76	28.000
III. University Grants Commission Schemes			
Department of Languages			
1. Advance research in Humanities and Social Science-A comprehensive study of the Linguistic Treatment of Message in Oral and Written Communication in Tamil by Scientists	Coimbatore	1.4.75	Closed on 31.3.76
Department of Agricultural Economics			
2. Pattern of Consumption, Savings and Investment in Agriculture	Coimbatore	1.7.75 to 30.6.76	50.000
IV. Schemes Implemented with Financial Support from Private Agencies			
1. M/s. Hindustan Lever Ltd., Bombay Research on Patchouli	Coimbatore	4.11.76	17.877
a) Sunflower Research Scheme	Kaveripattinam	4.11.76	17.000
b) -do-	Kovilpatti	6.11.76	17.000
2. M/s. The ICMF: Cotton Development and Research Association, Bombay The Scheme for breeding early maturing, drought resistant, medium staple cotton for harsh ecological Zones of Tamil Nadu	Kaveripattinam	17.12.74	51.230
3. Madras Fertilisers Scheme	Coimbatore		8.000
4. M/s. Rallis India Ltd., Bangalore Research on control of cotton pests	,,	10.12.75 to 31.8.76.	8.000
5. M/s. South India Viscose, Mettupalayam	Coimbatore	1.6.76	25,000
6. M/s. Seshasayee Paper and Boards Ltd., Erode Scheme for tree improvement programme	,,	,,	1,90,340

V. Assistance from the following International Agencies for research in the University:

1. German Democratic Republic.	Protocol arrangement for carrying out research on N-K relationship with certain crops under irrigation in three locations in the State.

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2. U.S.S.R.		Programme of Scientific exchanges and scientific co-operation between Indian National Science Academy and the USSR Academy of Sciences in respect of Nitrogen fixation in soil by (a) symbiotic and (b) Non-symbiotic processes from three participating Institutions from Indian side including Tamil Nadu Agricultural University, Coimbatore as one and Institute of Microbiology, Moscow from Soviet side	
3. International Foundation for Science, Stockholm, Sweden		The foundation has approved the following three projects of the University to be carried out over a period of three years. 1. Investigation on the relationship between Rhizobia and Forage Legumes $ 6,800 2. Studies on Microbiology of *idli* and *dosai* fermentation and development of new improved products — $ 5,000 3. Micorrhizal association in Tropical pines in Nilgiris — 6,000	
4. International Atomic Energy Agency, Vienna		Effect of pesticides on the metabolic activities of soil micro-organisms (from 9.6.76) $ 2000/	
5. Soil and Health Foundation, Pensylvania USA		Biofertilizers for increasing crop production $ 5000/	
6. Ford Foundation Grants Schemes at Coimbatore and Dharmapuri			3,25,750

Veterinary Faculty

Financed by the ICAR

Department of Animal Nutrition

1.	Evaluation of seaweed as a source of feed in poultry ration	Madras Veterinary College	30.5.71 to 29.5.76	2,10,000
2.	Comparative utility of ordinary maize, lysine rich maize and tapioca in pig ration	L. R. S., Kattupakkam	15.12.73 to 14.12.76	89,900
3.	Optimum fodder and concentrate feeding for growth and milk production	..	1.4.74 to 31.3.78	3,05,000
4.	Study on the effect of plan of nutrition on male buffalo calves for meat production	..	15.11.74 to 14.11.79	2,58,000

Department of Pathology

5.	Etiopathogenesis of necrotic hepatitis in poultry	Madras Veterinary College	7.2.75 to 6.2.78	29,100
6.	Studies on Avian Leucosis complex in Tamil Nadu		7.2.75 to 6.2.78	48,000

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Department of Parasitology				
7.	Scheme for studies on the incidence bionomic role in the causation of disease with special reference to transmission of Piroplasmosis and control of ticks of domestic stock	Madras Veterinary College	18.9.73 to 17.6.77	3 03 790
8.	Scheme for studies on immunisation against Tropical Theileriasis (T. annulata) in cattle of Tamil Nadu		30.8.74 to 29.6.77	1 65 550
Department of Physiology				
9.	Scheme for the development of high producing strains of chicken on the basis of serum alkaline phosphatase activity		24.1.73 to 23.7.76	1 75 906
10.	All India Co-ordinated Research Project (Sheep Breeding for fine wool)	Sheep Breeding Research Station Sandynallah	24.3.74 to 31.3.79	9 88 000
11.	Optimum fodder and concentrate feeding for milk production	L. R. S. Kattupakkam	1.4.74	95 540
12.	Studies on the effect of plan of nutrition on male buffalo calves for meat production		15.11.74	89 950
13.	Studies on comparative utility of ordinary maize, lysine rich maize and tapioca in pig ration		15.12.73 (scheme completed on 14.12.76)	36 170

APPENDIX III

BOOKS AND BOOKLETS PUBLISHED DURING 1976-77

Books

1. Recent Development in Agricultural Sciences in some Foreign Countries by G. Rangaswami
2. Research on Resistance in plants to insects and mites in Tamil Nadu by S. Jayaraj
3. Cotton programme and prospects in Tamil Nadu by S. Kamalanathan, published by Directorate of Agriculture, Madras
4. Irrigation and Drainage by R.K. Sivanappan and K.R. Karai Gowder published by Popular Book Depot, Madras

Booklets:

1. Weedicides by S. Sankaran, Tamil Nadu Agricultural University Communication Centre Publication No.4
2. Pests of paddy by S. Jayaraj, I.P. Janaki, M. Mohana-Sundaram and K. Velusamy, Tamil Nadu Agricultural University, Communication Centre Publication No.35
3. Diseases of paddy by C.L. Subramaniam, T.K. Kandaswamy and P. Narayanaswamy, Tamil Nadu Agricultural University, Communication Centre publication No.36
4. Pests of Cotton by. A. Abdul Kareem, S. Jayaraj and P. Thangavel, Tamil Nadu Agricultural University Communication Centre Publication No.37
5. Pulses in Tamil Nadu by R. Veerasamy, Tamil Nadu Agricultural University Communication Centre publication No.38
6. Pests of Fruit Crops by A. Abdul Kareem, S. Jayaraj and P. Thangavel, Tamil Nadu Agricultural University, Communication Centre Publication No.40
7. Pests of Oilseed Crops by. S. Jayaraj, E.V. Abraham and G. Balasubramanian, Tamil Nadu Agricultural University Communication Centre Publication No.41
8. Reclamation of Saline and Alkaline Soils by K. K. Krishnamoorthy, C. Krishnamoorthy and V. Ravikumar, Tamil-Nadu Agricultural University Publication No.42
9. Fish Culture by Samuel Paul Raj, Ramachandra Menon and M. N. Kutty, Tamil Nadu Agricultural University Publication No. 45

Journals

(a) *English* 1. Five monthly issues of The Madras Agricultural Journal.

(b) *Tamil* 1. Four issues of the quarterly journal 'Valarum Velanmai,

2. Six issues of monthly journal 'Kalanjiyam'
3. Four issues of monthly journal 'Uzhavar Madal'

VETERINARY COLLEGE, MADRAS

1. Cultivation of fodder (English and Tamil)
2. Hatchery sanitation
3. Detection of heat in cows (English and Tamil
4. Accredited Herd Scheme (English and Tamil)
5. Sterility in buffaloes
6. Fine wool production
7. Cultivation of forage crops
8. A primer on Poultry (Tamil) for functional literacy programme
9. A second reader in poultry (Tamil)
10. Definition of economic traits of different species of livestock and performance of breeding records
11. Johne's disease control programme at Sheep Breeding Research Station, Ootacamund

APPENDIX IV

LIST OF SCIENTIFIC PAPERS PUBLISHED

AGRICULTURAL BOTANY

1. Appadurai, R., C. Parambaramani and U. S. Natarajan. 1975. Note on the inheritance of susceptibility of pearl millets to downy mildew. Indian J. agric. Sci. 45(4): 179-180.

2. Appadurai, R. and R. Subramaniam. 1975. A genetic analysis in *Pennisetum typhoides* (Stapf and Hubb.) Madras agric. J. 62 (6): 321-325.

3. Appadurai, R., R. Subramaniam and K. V. Selvaraj. 1976. Response of irrigated cotton (MCU 3) to nitrogen application. Food Farming and Agriculture, 8: 17-18.

4. Chandramathi, P. S. 1976. Genetic analysis of yield and its components in *Gossypium hirsutum* L. Madras agric. J. 63 (1): 9-13.

5. Chandra Mohan, J. 1975. Rice-Latest trend in its breeding and culture. Newsletter Extension, Shaw Wallace No. 4,75.

6. Chandra Mohan, J. and R. Subramaniam. 1976. Tolerance to machete of different rice varieties grown under broadcast puddled condition. Pesticides, 6: 27-28.

7. Gopinath Nair, P. and V. S. Raman. 1975. Cytogenetic relationships and barriers to gene exchange in *Arachis*. Oleagineux. 30: 419-22.

8. Guruswamy Raja, V. D., R. Nagarajan, and S. Rajakutty. 1976. Genetic variablity in Metric Characters in wheat (*Triticum aestivum* L em. Thell.). Madras agric. J. 63 (2): 97-99.

9. Henry Louis, I. and M. Kadambavanasundaram. 1975. Induction of white eye mutant in cowpea (*Vigna sinensis* L. (Savi.). Madras agric. J. 62 (2): 95.

10. Kamalanathan, S. 1976. Cotton progress and prospects in Tamil Nadu. Published by Directorate of Agriculture, Madras.

11. Kunjamma Hrishi, V. K. and K. Meenakshi. 1976. Flowering studies in the plants of three sorghum hybrids at Tamil Nadu Agricultural University, Coimbatore. Sorghum Newsletter. 19: 83-84.

12. Krishnadoss, D., V. Dharmalingam, V. Sivasubramanian, L. Robinson and S. Iyemperumal. 1975. Study of vicinism with relation to selfing in *Gossypium arboreum* cotton. Madras agric. J. 62 (6): 380-382.

13. Krishnadoss, D., V. Dharmalingam, V. Sivasubramanian, U. Selvaraj and S. Iyemperumal. 1975. Effect of cycocel on yield and quality of rainfed cotton K. 8 (Gossypium arboreum) cotton. Farm Science. 2 (7) : 13-20.

14. Meenakshi, K., A. K. Fazlullah Khan and R. Appadurai. 1975. Effect of population densities and fertilizers on the yield of hybrid and composite maize. Madras agric. J. 62 (5) : 259-265.

15. Meenakshi, K., A. K. Fazlullah Khan and S. Palaniswamy. 1976. Varietal improvement in sorghum through three way and double crosses. Sorghum Newsletter. 19 : 73.

16. Meenakshi, K., A.K. Fazlullah Khan, C. Surendran, V. K. Kunjamma Hrishi and S. Palaniswamy. 1976. Development of composite sorghum varieties. Sorghum Newsletter. 19 76.

17. Mohamed Sheriff, N., R Veerasamy and P. Rangaswamy. 1976. Effect of pruning the twiners of Lab-lab Co 8. Madras agric. J. 63 (1) : 50-51.

18. Nagarajan, R. and V D. Guruswamy Raja. 1976. Preliminary studies on flower shedding in cowpea (Vigna sinensis L.). Madaras agric. J. 63 (1) : 60-61.

19. Paramasivan, K. S. 1975. Heterosis in Tall and Dwarf Indica Rice varieties. Madras agric. J. 62 (7) : 456 457.

20. Raman, V. S. 1975. Genomehomologies and the stability of hexaploid sorghum. Sorghum Newsletter. 18 : 62-64.

21. Raman, V. S 1976. Some cytogenetic aspects of hybrids between S. stapfii and other species of Eu-Sorghum. Sorghum Newsletter. 19 : 73.

22. Raman, V. S. and P. Gopinathan Nair. 1975. Experimental introgression in Arachis-chromosomal and morphological variation in progenies of allotriploid. Oleagineux. 30: 113-18.

23. Raman, V. S. and G. Manimekalai. 1975. Cytomorphology of hexaploids in Arachis. Oleagineux. 30: 215-218.

24. Raman, V. S. and G. Manimekalai. 1976. Phenotype and fertility in progenies of the hybrid, Arachis duranensis x A. villosa. Oleagineux. 31: 173-75.

25. Raman, V. S., K. Meenakshi and M. S. Thangam. 1976. Accessory chromosomes and their meiotic behaviour in hybrids of grain sorghum and Johnson grass. Cytologia. 41 193-200.

26. Raman, V.S., S R. Sreerangasamy and R. Sethupathi Ramalingam. 1976. Cytomorphology and stability of induced variants in Zinnia linearis. Cytologia. 41: 201-206.

27. Ramanathapillai O., V Sivasubramanian, S Srinivasan and A Janagarajan. 1976 Effect of foliar fertilization on yield and quality of rainfed cambodia cotton (G hirsutum) Fertilizer News 20 (8): 27-28

28. Rangasamy, P., R Veerasamy and C Ramalingam . '5 Studies on flowering and pod set in redgram (Cajanus cajan L Mill sp) Madras agric J 62 (5): 295-298

29. Sethupathi Ramalingam, R 1976 A note on the induced variations in chilli Curr Sci. 45: 9.

30. Soundarapandian, G., R Nagarajan, K Mahudeswaran and P. V Marappan 1975 Genetic variation and scope of selection for yield attributes in blackgram Phaseolus mungo L.) Madras agric J 62 (6): 318-20

31. Soundarapandian, G. R Nagarajan, K. Mahudeswaran and P V Marappan 1976 Genotypic and Phenotypic correlations and path analysis in blackgram, (Vigna mungo L) Madras agric J. 63 (2) 141-47

32. Subramanian, M. 1975 Cytogenetical studies on the interspecific hybrid between Sesamum radiatum Schum and Thonn, and Sesamum occidentale Heera Regel. Madras agric J 62 (9): 528-33.

33. Veeraswamy, R., P Rangaswamy and N. Mohamed Sheriff. 1975 Co 2 redgram-a new strain with early maturity and improved plant type Madras agric. J. 62 (9) 541-543.

34. Veerasamy, R. and R. Rathnaswamy. 1975. Character association analysis in soyabean (Glycine max (L) Merill.) Madras agric. J. 62 (9) : 534-36

AGRONOMY

35. Amirtham Antony Dason, K. Rajagopalan, A Muthusankaranarayanan, D. Raj and L. Sivagnanam. 1976. The influence of rainfall on the prosperity of Agriculture in Kovilpatti. Farm Science. 3 (1): 3-5

36. Balasubramanian, A., R. Venkataraman and SP. Palaniappan. 1977. Studies on the time of planting and seedling age on the performance of rice IR. 20 and IR. 8. Madras agric. J. 64 (1): 47-49.

37. Balasubramanian, N. and S. Sankaran. 1977. Residue of herbicides on crops following cotton. Abstract, Weed Science Conference at Workshop in India at Hyderabad, January 1977, p. 125.

38. Balu, S., A. V. Rajan, C. Kailasam, S. Sankaran and Y. B. Morachan. 1976. Relative efficiency of different herbicides on the control of white horsenettle. Madras agric. J. 63 (8) : 481-484.

39. Balu, S., A. V. Rajan, S. Sankaran and Y. B. Morachan. 1977. Evaluation of suitable herbicides for the control of Parthenium. Abstract, Weed Science Conference and Workshop in India at Hyderabad, January 1977, p. 107.

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41. Balu, S., A. V. Rajan, S. Sankaran and Y. B. Morachan. 1977. Control of White horsenettle with picloram and black polythene mulch. Abstract, Weed Science Conference and Workshop in India at Hyderabad, January 1977, p. 112.

42. Balu, S., A. V. Rajan, C. Kailasam, S. Sankaran and Y. B. Morachan. 1977. Effect of 2, 4-D and picloram on cereal crops infected with white horsenettle. Abstract, Weed Science Conference and Workshop in India at Hyderabad, January 1977, p. 112.

43. Balu, S. and S. Sankaran. 1977. Comparative efficiency of different herbicides for the control of weeds in transplanted rice. Abstract, Weed Science Conference and Workshop in India at Hyderabad, January 1977, p. 3.

44. Chamy, A., A. Damodharan, N. T. Jagannathan and Y. B. Morachan. 1976. Observations on the rooting pattern of CBS. 156 hybrid cotton. Madras agric. J. 63 (3) 207-208.

45. Chowdappan, S. R. and Y. B, Morachan. 1976. Effect of cycocel on yield and quality of cotton. Madras agric. J. 63 (4) : 211-214.

46. Daniel, K. V., T. Sugumaran and M. Suresh Kumar. 1976. Effect of nitrogen and potassium on yield and quality of sugarcane. Indian J. Agron. 21 : 292-294.

47. Daniel, K. V., T. Sugumaran and M. Suresh Kumar. 1976. Effect of nitrogen and potassium on the yield and quality of sugarcane (ratoon). Co-operative Sugar J. 10 : 341-344.

48. Daniel, K. V., and T. Sugumaran. 1976. A study on the control of weeds in sugarcane fields. Co-operative Sugar J. 10 : 481-486.

49. Devotta, A D and S R Chowdappan. 1976. Mixed Cropping of cotton with Legumes and non-legumes in Black cotton soils of Tamil Nadu. Madras agric. J. 63 (4) 221 214

50. Duraisamy, K. N., N Kamalam, T S. Theetharappan and C T. Devadas. 1976 National Demonstrations - A fore runner of change in Agricultural Technology Madras agric. J. 63 (10 12) : 641-644.

51. Elangovan. R., N. Gopalaswamy and C Nagarajan 1976 A note on the effect of different spacings on the growth of weeds in rainfed groundnut. Agriculture and Agro-Industries Journal 9. 10. 24

52. Gopalaswamy, N, R Elangovan, and Y B Morachan, 1976. Potash needs of irrigated groundnut. Indian Potash Journal 1, 4, 10.

53. Gopalaswamy, N. and R. Elangovan 1976. Effect of temperature and humidity on the yield of summer Peanut (Arachis hypogea). Food Farming and Agriculture. 8.

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APPENDIX V

NUMBER OF ENQUIRIES ANSWERED AND QUANTITY OF IMPROVED SEEDS, PLANTS ETC. SUPPLIED BY THE VARIOUS DEPARTMENTS OF THE TAMIL NADU AGRICULTURAL UNIVERSITY

Topics	No. of enquiries for which technical advice was provided	Quantity of seeds of improved strains supplied for experimental purposes (kg)	Quantity of seeds of improved strains supplied for multiplication [illegible]	Quantity of seeds of improved strains supplied for [illegible]	[illegible]
1	2	3	4	5	6
Rice	2,530	8,302	1,897	2,35,423	5,410
Millets	1,093	3,818		6,593	—
Minor Millets	260	84	—	1,209	—
Oilseeds	1,525	1,344	1,932	6,081	—
Coconuts-nuts and seedlings	—	—	—	—	1,79,865
Pulses	686	532	30	3,236	
Cotton	49	463	—	310	
Forages-seeds and slips	78	20	—	—	1,71,600
Fruits and plants	2,370	4,343	23	224	64,998
Chillies	147	1	1	97	
Fruit plants	63	—	—	—	9,364
Ornamental plants	—	—	—	—	3,432
Vegetable seeds and seedlings	2,188	228	176	2,273	53,035
Flower seeds and seedlings	400	—		—	10,837
Medicinal and Aromatic plants	234	—	—	—	4,100
Green manure seeds and plants	—	—	10	415	600
Seed technology	120	—	—	—	—
Forestry-seedlings	23	—	—	—	21,988
Implements, Soil & Water Conservation Engineering	67	—	—	—	—
Bacterial culture	2	—	—	—	50,000 (peat based cultures)

1	2	3	4	5	6
Mushroom (Spawn) bottles distributed	—	·	—	—	1,031
Plant Pretection-pests	201	—	—	—	—
-do- -diseases	300	·	—	—	—
Fertiliser enquiries	43	—	—	—	—
Fisheries	12	—	—	—	—
Animal Husbandry-milk sold	—	—	—	—	89,218
Eggs, birds, etc.	87	28	—	—	57,221
Sheep	52	—	—	—	—
Rams supplied	—	105	—	—	—
Ewes supplied	—	111	—	-	—
Insemination done	—	—	—	—	2,066
Semen supplied (vials)	—	—	—	—	65,770
Booklets sold	—	—	—	—	8,227
Squash bottles sold	—	—	—	—	761

APPENDIX VI

LIST OF POPULAR ARTICLES AND JOTTINGS PUBLISHED

S. No.	Title of the article	News paper / Journal in which published
1.	CBS 156 Cotton	Farm Week - April 1976
2.	Campaign against dirt and diseases	Indian Express - April 1976 The Hindu - April 1976
3.	Protection of pulse seeds from insects	Indian Express - April 1976 Farm Week - May 1976 Farm & Factory - June 1976
4.	Drought resistant crops and their managements	Pannai Thozhil - April 1976 Malai Murasu - March 1976 Nila Valam - May 1976
5.	Manurial Experiments in Paddy	Pannai Thozhil - April 1976 Vignana Vivasayam - September 1976 Uzhavar Thunaivan - August 1976 Uramum Payirum - October 1976
6.	Role of Ethrel on the yield of Vegetables and Pulses	Er Uzhavan - March 1976 Kalanjiyam - April 1976 Pannai Thozhil - May 1976 Mahajanam - May 1976
7.	Soil Testing	Er Uzhavan - March 1976 Kalanjiyam - April 1976
8.	Some latest techniques in jasmine cultivation	Nila Valam - May 1976 Er Uzhavan - April 1976 Kalanjiyam - April 1976 Pannai Thozhil - May 1976 Uzhavar Thunaivan - July 1976
9.	Paddy varieties suitable for Periyar Ayacut area	Mahajanam - April 1976 Nila Valam - June 1976 Uramum Payirum - April 1976 Uzhavar Thunaivan - August 1976

10.	High Yielding capacity of Co. 38 and Co. 39 paddy varieties	Mahajanam - April 1976 Uzhavar Thunaivan April 76 & Jul.76 Kalanjiyam - August 1976 Pannai Thozhil - August 1976
11.	Saline Resistant crops	Mahajanam - April 1976
12.	Appropriate herbicides for crops	Uzhavar Thunaivan - March 1976 Pannai Thozhil - May 1976 Malai Murasu - May 1976
13.	Results that give confidence	Uzhavar Thunaivan - March 1976
14.	Release from TNAU	Intensive Agriculture - May 1976
15.	Malabaria earthworm and its control	Junior Scientist - June 1976 Uzhavar Thunaivan - May 1976
16.	Measure to control diseases in gingelly	Malai Murasu - June 1976
17.	Using gobar gas to operate diesel engines	Nava India - June 1976 The Hindu - June 1976 The Indian Express - June 1976
18.	Ways to increase jasmine yield	Malai Murasu - June 1976
19.	Jinktam (Cool Drinks)	Mahajanam - June 1976
20.	Labour saving maize sheller	Er Uzhavan - May 1976 Pannai Thozhil - June 1976
21.	Grow pulses in proper seasons	Pannai Thozhil - June 1976
22.	A note to Robusta banana growers	Pannai Thozhil - June 1976
23.	Groundnut grader	Pannai Thozhil - June 1976 Nilavalam - September 1976 Kalanjiyam - July 1976 Malai Murasu - July 1976 Uzhavar Thunaivan - July 1976
24.	Cultivation hints for short duration high yielding varieties	Pannai Thozhil - May 1976 Nila Valam - April 1976
25.	Is there any reduction in the yield of guava?	Pannai Thozhil - June 1976 Nila Valam - April 1976
26.	Optimum spacing for paddy	Nila Valam - April 1976

27.	Direct sowing experiment in paddy	Nila Valam - April - May 1976
28.	Yield of paddy varieties at Aliyar Nagar Research Station.	Nila Valam - April - May 1976
29.	Grow crops in proper seasons	Uzhavar Thunaivan - April 1976
30.	Food Preparation from Papaya	Uzhavar Thunaivan - April 1976
31.	Poultry Research activities at TNAU	Poultry Guide - July 1976
32.	Extension Education activities of TNAU	Poultry Guide - July 1976 SPIC News July 1976
33.	New techniques to improve keeping quality of banana	Indian Express - July 1976
34.	Purposeful English in Farm University	Indian Express - July 1976 Times of India - July 1976 Mahajanam - September 1976
35.	Fish production in sewage farms	The Mail - June 1976 The Hindu - June 1976 Vignana Vivasayam - August 1976
36.	Water logging - Remedial measures	Kisan World - June 1976
37.	Rust and Alternaria leaf spot on sunflower	Kisan World - June 1976
38.	Tobacco root bug on cotton	Kisan World - July 1976
39.	Saline Water for Irrigation	Kisan World - July 1976
40.	Cotton progress and prospects in Tamil Nadu	Farm Science - July 1976
41.	Skip furrow Irrigation for cotton	Indian Farming - June 1976
42.	Co. 3 Blackgram	Kisan World - November 1976
43.	Co. 3 Greengram	Kisan World - November 1976
44.	Co. 1 Snake gourd	Agro News - August 1976 Uzhavar Thunaivan - May 1976
45.	Co. 1 Ribbed gourd	Agro News - August 1976 Kisan World - September 1976

46.	Co. 1 Sweet Potato	Farm and Factory - August 1976 Er Uzhavan - January 1977 Kanyakumari Co-operative circular - November 1976
47.	Controlling insects without environmental pollution	Indian Express - July 1976 The Hindu - August 1976 Farm Week - October 1976
48.	Effectiveness of Extension Methods	The Hindu - July 1976 Deccan Herald - July 1976
49.	Foliar spray increases profit in paddy	Farm and Factory - August 1976
50.	Bio-chemical evaluation of Food in the TNAU Hostel	The Hindu - August 1976 Er Uzhavan - August 1976 Ilam Vignani - September 1976
51.	Optimum Farm Plan to increase Farm income	The Hindu - September 1976 Indian Express - September 1976 Dinamani - September 1976 Uzhavar Thunaivan-December 1976
52.	Socio-economic changes in Grape vine growers in Coimbatore Dist.	The Hindu - September 1976.
53.	Carbofuran - Best to Control shootfly	Agro News - August 1976
54.	Tomato varieties	Agro News - August 1976 Vignana Vivasayam - February 1977
55.	Best way of storing pulses seeds	Kalanjiyam - August 1976 Vignana Vivasayam - August 1976 Er Uzhavan - August 1976 Uramum Payirum - October 1976 Tamilarasu - September 1976 Ilam Vignani - September 1976 Kisan World - February 1977
56.	Nitrogen management of CSH 5 cholam in Tamil Nadu	Kisan World - August 1976
57.	Vinca rosea, a profitable medicinal plant	Farm and Factory - September 1976

58.	Rose concrete	Kisan World - September 1976
59.	Pesticides residues in vegetables	Indian Express - October 1976
60.	Cumbu - Napier grass for paper production	Indian Express - September 1976
61.	Bacterial culture helps to reduce fertilizer bill	Indian Express - September 1976 Uzhavar Thunaivan - September - October 1976
62.	Use of chemical weed killers	The Hindu - October 1976 Ez Uzhavan - July 1976 Uzhavar Madai - August 1976 Kalanjiyam - August 1976 Pannai Thozhil - August 1976
63.	Farm University suggests alternative crop strategy	Indian Express - September 1976 Dinamani - October 1976
64.	Groundnut - Rust disease	Kisan World - November 1976 Farm & Factory - October 1976 Madurai Kooturavu-November 1976 M. P. Agro News - November - December 1976
65.	Chemical ripeners improve juice quality of sugarcane	Kisan World - November 1976 Farm and Factory - September 1976 The Hindu - November 1976 Indian Express - November 1976 Madurai Kooturavu - November Ilam vignani February 1977 Kisan World - March 1977 Agro News - January February 1977
66.	Seed Production technique in greengram	Kisan World - November 1976 Kisan World - December 1976 Madurai Kooturavu November 1976 Mahajanam - January 1977 Kanyakumari Cooperative Circular - December 1976 Uzhavar Nalam - Margazhi December 1976 Kisan World - February 1977 Uzhavar Nalam - Thai-January 1977
67.	Control of Crossandra wilt	Kisan World - November 1976 Uzhavar Thunaivan - July 1976 Madurai Kooturavu-November 1975

68.	Mango Stem borer	Kisan World - November 1976 Uzhavar Thunaivan - May 1976 Vignana Vivasayam - August 1976
69.	Prevention of seepage in channels, ponds and tanks	Kisan World - November 1976
70.	Importance of sulphur application in the soil	Farm Week - October 1976
71.	Preservation of pulse seeds by chemicals	Farm Week - October 1976 Malai Murasu - December 1976 Int. Agri. - August 1976 Kalanjiyam - July 1976 Er Uzhavan - July 1976 Nila Valam - October - November 1976 Kisan World - February - 1977
72.	New strategy to boost rice output	Indian Express - November 1976 Farm Week - Annual No. 1976 Mahajanam - December 1976 The Mail - November 1976 Tholil India - December 1976 January 1977 Kanyakumari Cooperative circular - November 1976
73.	Control of banana nematode by pralinage	Farm and Factory - October 1976 M. F. Agro News - November - December 1976 Kanyakumari Cooperative Circular - November 1976
74.	Co. 2 Papaya for papain	Int. Agri - July 1976
75.	A new pumpkin for your kitchen	Int. Agri – September 1976
76.	Control tomato leaf curl virus	Int. Agri - September 1976
77.	Flower drop in chillies	Int. Agri - September 1976
78.	Use of Fertilizers for sweet potato	Int. Agri - September 1976
79.	Groundnut Surul Poochi	Kalanjiyam – July 1976
80.	Drought resistant crops and management	Illam Vignani - July 1976 Kalanjiyam - July 1976 Uramum Payirum - October 1976

81.	Radish - suitable for southern districts	Kalanjiyam - July 1976 Nila Valam - July 1976 Uzhavar Thunaivan - August 1976 Uramum Payirum - October 1976
82.	Black-arm disease of gingelly	Mahajanam - July 1976 Kalanjiyam - July 1976 Uzhavar Thunaivan - August 1976
83.	Maize sheller	Malai Murasu - July 1976 Kalanjiyam - July 1976 Uzhavar Thunaivan - August 1976 Vignana Vivasayam November 1976
84.	Increase your Guava Yield	Mahajanam - July 1976 Kalanjiyam - July 1976 Uzhavar Madal - August 1976 Uzhavar Thunaivan - August 1976 Vignana Vivasayam-November 1976
85.	Jasmine mite	Mahajanam - July 1976 Kalanjiyam - July 1976 Uzhavar Thunaivan - July 1976 Vignana Vivasayam-November 1976
86.	Control measures for Bengalgram - pod borers	Kalanjiyam - July 1976
87.	Irrigated cholam cultivation	Kalanjiyam - July 1976 Nila Valam-October November 1976
88.	Transplanting cumbu	Kalanjiyam - July 1976
89.	New Hybrid cholam	Uzhavar Thunaivan - May 1976 Er Uzhavan - July 1976 Vignana Vivasayam - August 1976
90.	Optimum spacing for higher yield in sunflower	Pannai Thozhil - July 1976
91.	Rainfed cholam and its N requirement	Uzhavar Thunaivan - May 1976
92.	Crop rotation in Coimbatore	Uzhavar Thunaivan - May 1976
93.	Stabilising underground water	Uzhavar Thunaivan - May 1976 Pannai Thozhil - October 1976

94.	Drip Irrigation - An advancement in irrigation Technology	Uzhavar Thunaivan - May 1976 Tamilarasu - July 1976 Pannai Thozhil - October 1976
95.	One Moringa per House	Uzhavar Thunaivan - May 1976 Vignana Vivasayam-November 1976
96.	Microbial Pathogen for pest control	Uzhavar Thunaivan - May 1976
97.	Reclamation of Alkali lands	Uzhavar Thunaivan - May 1976
98.	Tips for Robusta growers	Uzhavar Thunaivan - May 1976
99	Package of practices for CBS 156	Er Uzhavan - July 1976 Nava India – August 1976 Pannai Thozhil - November 1976 Nila Valam-October-November 1976 Uramum Payirum-Aadi-Aavani 1976
100.	Proverbs relationg to weeds	Nila Valam - June 1976
101.	Is rain alone sufficient ?	Nila Valam - June 1976
102.	Ways to increase Vegetable out-put	Malai Murasu - July 1976
103.	Optimum spacing for rice	Uramum Payirum - April 1976 Uzhavar Thunaivan - August 1976
104.	Package of practices for short duration rice varieties	Uramum Payirum - April 1976 Uzhavar Thunaivan - July 1976
105.	Direct seeding experiment in rice	Uramum Payirum - April 1976 Uzhavar Thunaivan - August 1976
106.	Yield of paddy varieties at Aliyar Nagar.	Uramum Payirum - April 1976 Uzhavar Thunaivan - August 1976
107.	Delinting of cotton seeds	Er Uzhavan - July 1976 Kalanjiyam - August 1976 Pannai Thozhil - August 1976 Ilam Vignani - September 1976 Uramum Payirum-Aadi-Aavani 1976
108.	Coconut wilt - symptoms and control measures	Er Uzhavan - July 1976 Kalanjiyam - August 1976 Vignana Vivasayam - August 1976

109.	Groundnut decorticator	Er Uzhavan - July 1976 Ilam Vignani - August 1976 Kalanjiyam – August 1976 Thozhil India November 1976
110.	Correct season for cotton cultivation.	Pannai Thozhil - August 1976
111.	Cotton pests and control measures	Er Uzhavan - August 1976 Vignana Vivasayam - August 1976 Pannai Thozhil - August 1976
112.	Sulphur for onion	Ilam Vignani - August 1976 Pannai Thozhil - August 1976 Er Uzhavan - August 1976 Uramum Payirum - October 1976 Vignana Vivasayam-November 1976 Tamilarasu - September 1976
113.	Is there any use in factory wastes?	Pannai Thozhil - August 1976 Er Uzhavan - August 1976 Ilam Vignani - August 1976 Vignana Vivasayam-November 1976 Tamilarasu - September 1976
114.	Problems in tomato production and marketing.	Thozhil India - August 1976
115.	Double cropping in drylands	Vignana Vivasayam - August 1976
116.	Azotobacter for cotton	Pannai Thozhil - August 1976 Uramum Payirum - October 1976 Nava India - October 1976 Thamilarasu - September 1976 Uzhavar Thunaivan - September October 1976
117.	New technique to boost cotton yield	Er Uzhavan - August 1976 Pannai Thozhil - August 1976 Uramum Payirum - October 1976
118.	Cow-dung gas	Mahajanam - August 1976 Pannai Thozhil – August 1976 Ilam Vignani - August 1976 Vignana Vivasayam-September 1976 Thozhil India - November 1976 Uzhavar Thunaivan - August 1976 Uramum Payirum-Aadi,Aavani 1976

119.	Control of cotton nematode	Pannai Thozhil - August 1976 Er Uzhazan - August 1976 Mahajanam - September 1976 Uramum Payirum - October 1976 Thamilarasu - September 1976
120.	Do it casually : you will get intererest	Nila Valam - August 1976
121.	How to arrest flower and boll drops in cotton	Malai Murasu - August 1976 Pannai Thozhil - August 1976 Kalanjiyam - August 1976 Er Uzhavan - August 1979 Uramum Payirum-Aadi, Aavani 197(
122.	Can we mix urea in pesticide solution ?	Nila valam - August 1976 Pannai Thozhil - August 1976 Er Uzhavan - August 1976 Thamilarasu - September 1976 Mahajanam - September 1976 Uramum Payirum - October 1976
123.	Less fertilizer - More yield in groundnut.	Ilam Vignani - August 1976 Pannai Thozhil - August 1976 Er Uzhavan - August 1976 Uramum Payirum - October 1976 Thamilarasu - September 1976
124.	Raw material to produce paper at low cost	Ilam Vignani - August 1976 Pannai Thozhil - August 1976 Er Uzhavan - August 1976 Thamilarasu - September 1976
125.	Azotabacter for rice	Uzhavar Thunaivan - July 1976 Kalanjiyam - August 1976 Ilam Vignani - August 1976 Pannai Thozhil - August 1976 Nila Valam - September 1976 Nava India - October 1976 Uramum Payirum - Aaei, Aavani 197
126.	Can we mix Azotobater with pesticides	Nava India - August 1976 Pannai Thozhil - August 1976 Er Munai Madal - September 1976 Vignana Vivasayam - February 197

127.	Poultry feed	Nava India - August 1976 Er Uzhavan - August 1976 Pannai Thozhil - August 1976
128.	Banana-a sweet medicine	Er Uzhavan - August 1976
129.	Control of Poultry lice	Kanyakumari Co-op. Circular - December 1976 Nava India - August 1976 Pannai Thozhil - August 1976 Er Uzhvan - August 1976 Uzhavar Nalam-Thai 1977
130.	Shoot fly in sorghum	Malai Murasu - August 1976 Nava India - August 1976 Er Munai Madal - September 1976 Uzhavar Madal - October 1976 Vignana Vivasayam-November 1976 Vignana Vivasayam - February 1977
131.	Inter-crop in dry sorghum	Malai Murasu - August 1976 Nava India - August 1976 Er Munai Madal - September 1976
132.	Good coconut nursery	Malai Murasu - August 1976 Nava India - August 1976 Er Uzhavan - August 1976
133.	Phosphorus and potash requirements of rice	Uzhavar Madal - August 1976
134.	Get more profit through inter crop	Malai Murasu - August 1976
135.	Pod borers of redgram	Malai Murasu - August 1976 Er Uzhavan - September 1976 Er Uzhavan - January 1977
136.	How to get more yield in cotton	Malai Murasu - September 1976 Tamilarasu - September 1976
137.	Saline resistant crops	Uzhavar Thunaivan-September 1976 Ilam Vignani - September 1976
138.	Tapioca cuttings	Ilam Vignani - September 1976 Er Uzhavan - September 1976 Pannai Thozhil - October 1976 Uramum Payirum-Aadi, Aavani 1976

139.	Mango nut pakoda (dish)	Ilam vignani - September 1976 Vignana Vivasayam-September 1976 Nila Valam - September 1976
140.	Simple way to protect seeds	Er Uzhavan - September 1976 Kalanjiyam - January 1977
141.	Honey - A good medicine	Er Uzhavan - September 1976
142.	New findings in sorghum	Vignana Vivasayam-September 1976 Er Uzhavan - September - 1976 Pannai Thozhil - October 1976
143.	Control of paddy pests	Er Uzhavan - September 1976 Vignana Vivasayam-September 1976
144	Ragi suitable for Pondy area	Vignana Vivasayam-September 1976 Er Uzhavan - September 1976
145.	Groundnut suitable for Salem and Dharmapuri Districts	Er Uzhavan - September 1976
146.	Cholam suitable for winter	Er Uzhavan - September 1976 Pannai Thozhil - October 1976
147.	New method of arresting seepage	Er Uzhavan - September 1976
148.	Ragi suitable for rainfed farming.	Mahajanam - September 1976 Uramum Payirum - October 1976 Malai Murasu - November 1976 Tamilarasu - September 1976
149.	Paddy leaf roller and fly	Uzhavar Thunaivan - July 1976
150.	Why Agricultural Graduates go out for jobs?	Uzhavar Thunaivan - July 1976
151.	Neem in Agriculture	Uzhavar Thunaivan - July 1976 Vignana Vivasayam-November 1976
152.	Tamarind	Uzhavar Thunaivan - July 1976
153.	Usefulness of Soil testing - A study	Uzhavar Thunaivan - July 1976
154.	Millet ready mix	Uzhavar Thunaivan - July 1976

155.	A study on Farmers' Training Centre	Uzhavar Thunaivan - July 1976
156.	Farmers in the socio economic ladder	Uzhavar Thunaivan - July 1976
157.	I feel unhappy if it rains	Vignana Vivasayam-September 1976 Nila Valam - May - July 1976
158.	Double profit through double planting of banana	Vignana Vivasayam - August 1976 Tamilarasu - June 1976
159.	Crop in proper season	Vignana Vivasayam - September 1976
160.	Coconut bud rot	Pannai Thozhil - November 1976 Madurai Kooturavu-October 1976 Malai Murasu - November 1976 Uzhavar Thunaivan-September 1976 Vellore Kooturavu - December 1976
161.	Coconut stem bleeding disease	Madurai Kooturavu-October 1976 Malai Murasu - November 1976 Pannai Thozhil - November 1976 Vellore Kooturavu - December 1976
162.	Rainfed crop varieties for Southern Districts	Madurai Kooturavu - October 1976 Pannai Thozhil - November 1976 Uzhavar Thunaivan - September-October 1976
163.	Peanut butter	Er Uzhavan - August 1976 The Junior Scientist-December1976 The Mail - November 1976 Kisan World - February 1977
164.	Environmental pollution	Er Uzhavan - October 1976 Pannai Thozhil - November 1976 Ilam Vignani - November 1976
165.	Pest control for brinjal	Er Uzhavan - October 1976 Uzhavar Thunaivan - September - October 1976 Kalanjiyam - January 1977

166.	Opimum spacing & fertilizer for coconut	Uramum Payirum - October 1976 Uzhavar Madal – October 1976
167.	Water Management for various crops	Pannai Thozhil - October 1976
168.	Pesticide residues on Vegetables	Indian Express - October 1976 Dinamani - October 1976 Ilam Vignani - December 1976 Uzhavar Thunaivan - September October 1976. Er Uzhavan - December 1976
169.	Control of paddy fulgorid	Dinamani - November 1976 Madurai Kooturavu-November 1976 Uzhavar Nalam - Margali 1976
170.	Seed treatment for different crops	Dinamani - November 1976 Uzhavar Thunaivan - September October 1976
171.	Intercrop in coconut	Dinamani - November 1976 Uzhavar Thunaivan - September October 1976 Pannai Thozhil -December 1976 Nila Valam-October, November 1976
172.	Coconut wilt disease	Dinamani - November 1976 Uzhavar Thunaivan - August 1976 Pannai Thozhil - November 1976
173.	Ideal mixed crop for drylands	Uzhavar Thunaivan - August 1976 Dinamani - November 1976
174.	Mixed cropping	Malai Murasu - November 1976
175.	Profitable crop rotation	Dinamani- November 1976 Pannai Thozhil - November 1976 Uzhavar Thunaivan - September October 1976 Nila Valam - October November 1976
176.	Season to sow pulses	Dinamani - November 1976 Pannai Thozhil - November 1976 Uzhavar Thunaivan - September October 1976

177.	Efficient water use in rice	Dinamani - November 1976 Vignana Vivasayam-November 1976 Kanyakumari Cooperative circular - November 1976
178.	Mulching in drylands	Dinamani - November 1976
179.	Jack cultivation	Dinamani - November 1976
180.	New high-yielding onion Co. 2	Malai Murasu - November 1976 Uzhavar Thunaivan - December 1976 Pannai Thozhil - December 1976
181.	Methods of using Azotobacter	Pannai Thozhil - November 1976
182.	Some misconceptions about egg	Pannai Thozhil - November 1976 Uzhavar Thunaivan - September October 1976
183.	Feeds for buffalo calves	Pannai Thozhil - November 1976 Er Uzhavan - November 1976 Uzhavar Thunaivan - September October 1976
184.	Co. 1 Bhendi	Vignana Vivasayam–November 1976
185.	Water management in rice	Vignana Vivasayam-November 1976
186.	Phosphan-D increases crossandra yield	Vignana Vivasayam-November 1976
187.	Magnesium sulphate increases rice yield	Vignana Vivasayam-November 1976
188.	Ways to get more yield in sun-flower	Vignana Vivasayam-November 1976
189.	Do we get higher income by urea spray on rice?	Vignana Vivasayam-November 1976
190.	Control of paddy stem-borer and gall-midge	Nila Valam - September 1976 Vignana Vivasayam-November 1976 Uzhavar Thunaivan-December 1976
191.	Yield potential of coconut	Vignana Vivasayam-November 1976
192.	Optimum fertiliser dose for Co. 6304 cane	Vignana Vivasayam-November 1976

193.	Bunchy top disease in banana	Vignana Vivasayam-November 1976 Er Uzhavan - November 1976
194	Virus diseases of cane	Mahajanam - November 1976 Madurai Kooturavu-November 1976 Malai Murasu - January 1977 Er Uzhavan - January 1977
195.	Red rot disease of sugarcane	Mahajanam - November 1976 Madurai Kooturavu-November 1976 Malai Murasu - January 1977 Er Uzhavan - January 1977
196.	Sett rot disease of cane	Kooturavu Sudar-November 1976 Madurai Kooturavu-November 1976 Malai Murasu - January 1977 Er Uzhavan - January 1977
197.	Bacterial culture treatment for pulses	Kooturavu Sudar - November 1976 Madurai Kooturavu - November 1976
198.	Mixed cropping and intercropping	Kooturavu Sudar - November 1976 Madurai Kooturavu-November 1976
199.	Yellow spot disease of cane	Madurai Kooturavu-November 1976 Mahajanam - November 1976 Nava India – January 1977 Malai Murasu - January 1977 Er Uzhavan - January 1977
200.	Grassy shoot disease	Madurai Kooturavu–November 1976 Malai Murasu - January 1977 Er Uzhavan - January 1977
201.	Root rot disease of cane	Madurai Kooturavu-November 1976 Malai Murasu - January 1977 Er Uzhavan - January 1977
202.	Tip rot of sugarcane	Madurai Kooturavu-November 1976 Malai Murasu - January 1977 Er Uzhavan – January 1977
203.	Smut disease of cane	Madurai Kooturavu-November 1976 Malai Murasu – January 1977 Er Uzhavan - January 1977

204.	Sugarcane wilt	Madurai Kooturavu-November 1976 Malai Murasu - January 1977 Er Uzhavan - January 1977
205.	Production technique of hybrid cumbu	Madurai Kooturavu-November 1976
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209.	New caterpillar pest on cotton	Er Uzhavan - November 1976
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211.	White aphid in chilli	Er Uzhavan - November 1976 Uzhavar Nalam - Margali 1976
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213.	Fish diseases and control	Uzhavar Thunaivan - August 1976
214.	Cement pipes for better irrigation	Nila Valam - September 1976
215.	Optimum manure for groundnut	Nila Valam - September 1976
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228.	Salt solution spray for early maturity of grains	Pannai Thozhil - December 1976 Uzhavar Thunaivan - September October 1976
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233.	How to use *Azotobacter* in paddy?	Ilam Vignani - December 1976 Uzhavar Thunaivan-December 1976
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235.	Earn while you learn	Uzhavar Thunaivan-December 1976

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240.	Granular insecticides for chilli pests	Er Munai Madal - December 1976 Er Uzhavan - December 1976 Vellore Kooturavu - December 1976
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298.	Co. 4 Tenai	Vignana Vivasayam - January 1977
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323.	Bhendi disease	Vignana Vivasayam-February 1977
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331.	Nematode problem in Grapes	-do-

332.	An important aspect in grain storage	Madurai Kooturavu - January February 1977
333.	Maize - Cowpea mixture - Good cattle feed	-do-
334.	We too can prepare Jam	-do-
335.	New Sweet Potato	Ilam Vignani - February 1977 Vellore Kooturavu Malar - January 1977
336.	Optimum season for tapioca planting	-do-
337.	Mixing Rhizobial culture with Legume seeds	-do-
338.	Potash requirements of bunch groundnut	-do-
339.	Phosphorus deficiency of rice crop	TNCMF Newsletter - January 1977
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341.	Fresh groundnut can be sown	-do-
342.	Radish cultivation	Er Munai Madal - February, March 1977
343.	Reclamation of Alkali soils	-do-
344.	Saline soil problems	-do-
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352.	Control of Redgram pod borers	-do-
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354.	Tipping in Robusta banana improves quality	-do-
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359.	Sweet potato suitable for southern districts	-do-
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469.	Food value of egg	Valarum Velanmai-October 1977
470.	Nitrogen and leaf reller incidence	Agro News-January, February 1977
471.	Turkey rearing	Valarum Velanmai - April 1976
472.	Buffalo breed and milk production	Valarum Velanmai - July 1976
473.	Feasibility of introducing Crop Insurance for major millets and rice in Tamil Nadu	Agri and Agro Industries Journal May 1976

474.	Irrigation in Green Revolution	Valarum Velanmai - April 1976
475.	Coimbatore needs better milk supply	Indian Express - October 1976
476.	Need for Resource Use Plan to develop Dharmapuri District	Indian Express - October 1976
477.	Rice bran, a good source of edible oil	Indian Express - February 1977
478.	Modern scientific method of sheep rearing advocated in Nilgiris	Souvenir - Rotary Club of Ootacamund - April 1976
479.	Triange of life	Madras Veterinary College Annual, 1976
480.	Investigation on the nutritional aspects of calf starter for weakened calves	-do-
481.	Formulation of a pelleted feed for laboratory animals (mice and rats)	-do-
482.	Investigations on the use of thippi as maize replacer in layer mash	-do-
483.	Investigation on the nutritive value of agathi (Sesbania grandiflora) as green fodder for sheep	-do-
484.	In vitro dry matter and organic matter digestibility of some common feeds	-do-
485.	Determination of metabolizable energy of thippi in growing chicks	-do-
486.	Economics of broiler production	-do-
487.	Incidence of poultry diseases in Tamil Nadu	Poultry Guide - July 1976
488.	Extension activities and poultry farmers - Role of Madras Veterinary College	-do-

489.	Jack	Junior Scientist - February 1977
490.	Processing Green gram	Kisan World - February 1977
491.	Make Saline Soils Productive	Agri. & Agro Industries J. - January 1977
492.	Crop improvement in cumbu	Kisan World - March 1977
493.	Optimum fertilizers for maximum yield in ground nut.	Kisan World - March 1977
494.	Response of MCU. 5 cotton to irrigation schedule	Agro News-January, February 1977
495.	Retention of knowledge gained from posters	-do-
496.	Recomendations of National Demonstrations	-do-
497.	Small Farmers & utilisation of loans	-do-
498.	Problems in Tomato production and marketing	Vegetable & Pulse Seminar Souvenir, Agric. Dept. - March 1977
499.	Dishes & Juice from Tomato	-do-
500.	Vegetable varieties suitable for Tamil Nadu	-do-
501.	Nematode and fruit borer problems in Brinjal	-do-
502.	Diseases of vegetable crops	-do-
503.	Pests on Pulse crops	-do-
504.	Research in Pulses in Tamil Nadu	-do-
505.	Pests on vegetable crops	-do-

INTERNATIONAL SEMINAR ON
EDUCATION & COMMUNITY DEVELOPMENT IN INDIA
June 16 - July 6, 1976
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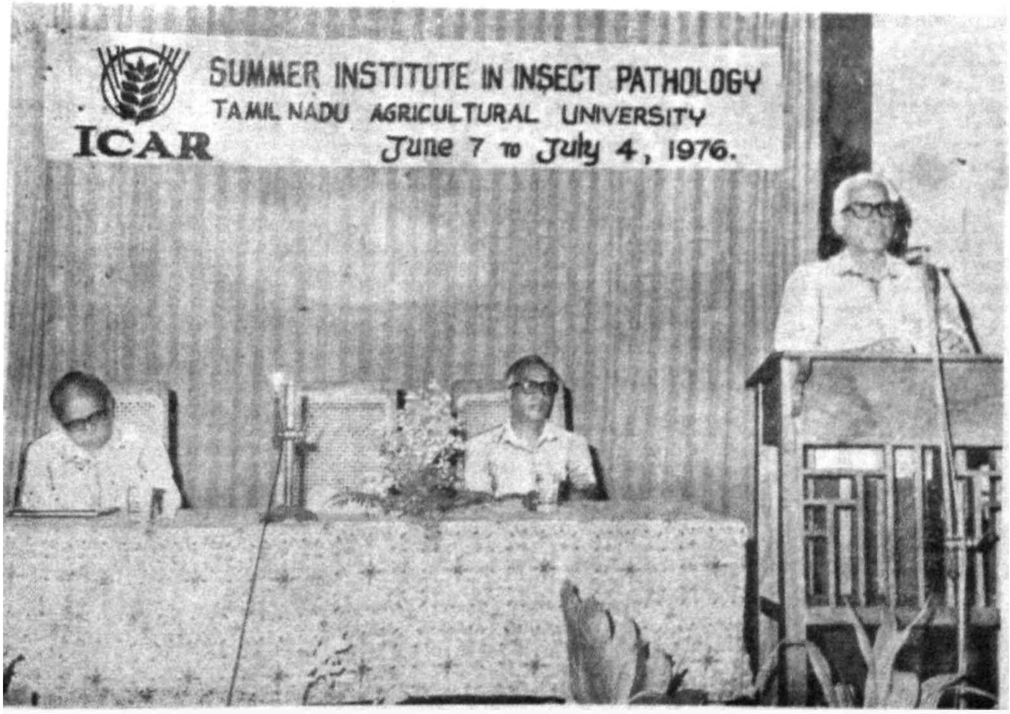
SUMMER INSTITUTE IN INSECT PATHOLOGY
TAMIL NADU AGRICULTURAL UNIVERSITY
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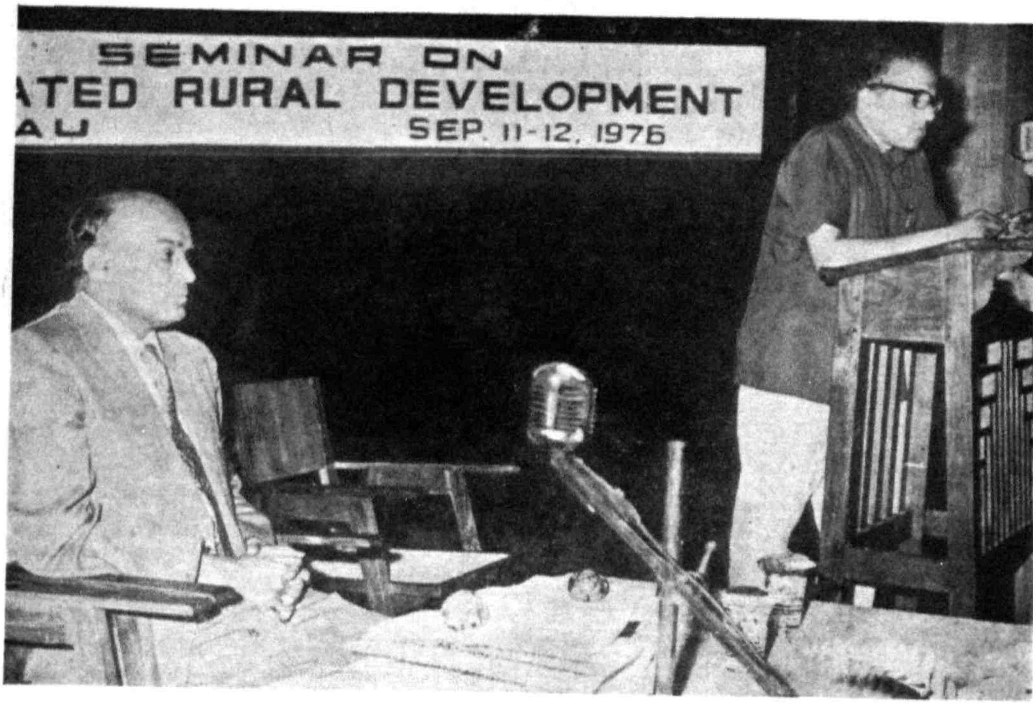
June 7 to July 4, 1976.


SEMINAR ON
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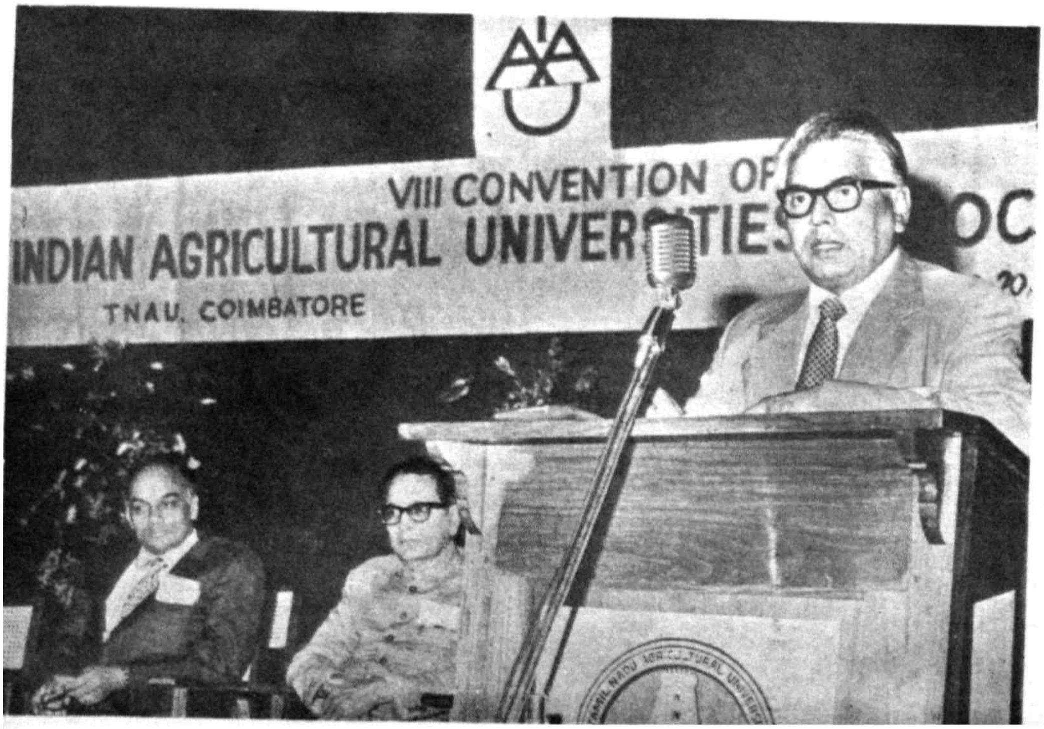
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SECOND NATIONAL SEMINAR ON
MANAGEMENT OF AGRICULTURE
JULY 29 - 31, 1975
TNAU

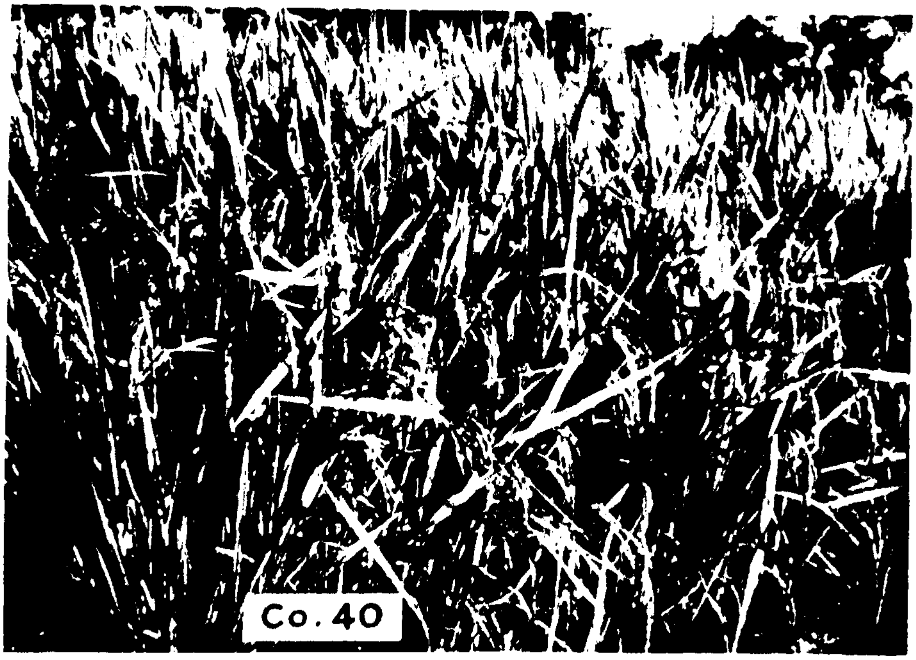
SEMINAR ON
SOIL CONSERVATION
TECHNOLOGY
TNAU FEB. 7-10, 1977

Students' Earn While You Learn Programme — Vegetable Cultivation

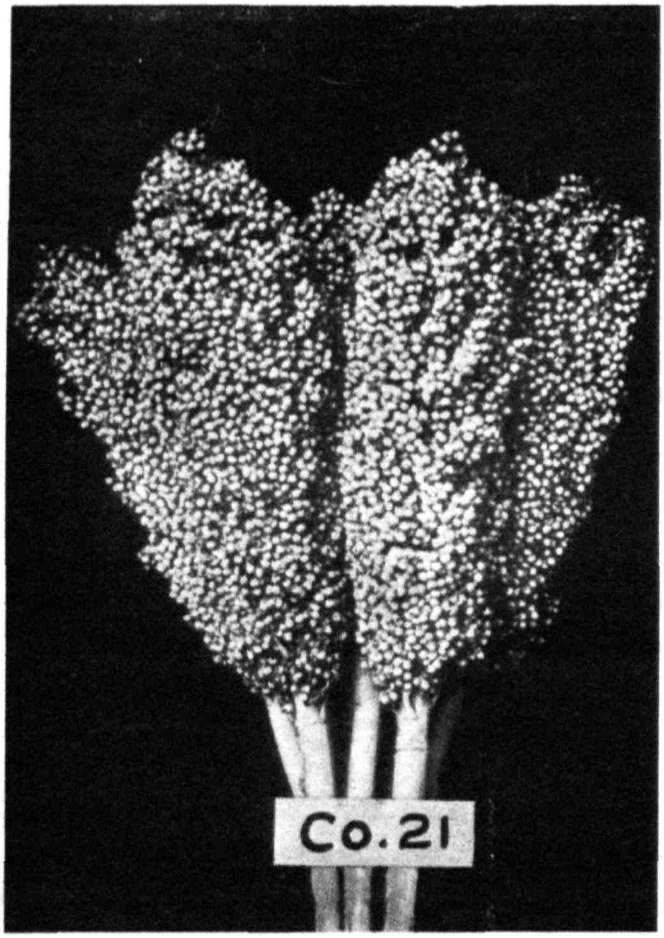
NSS Volunteers' shramdan for house construction in a harijan colony in Vedapatti

Students collect used clothes for flood relief

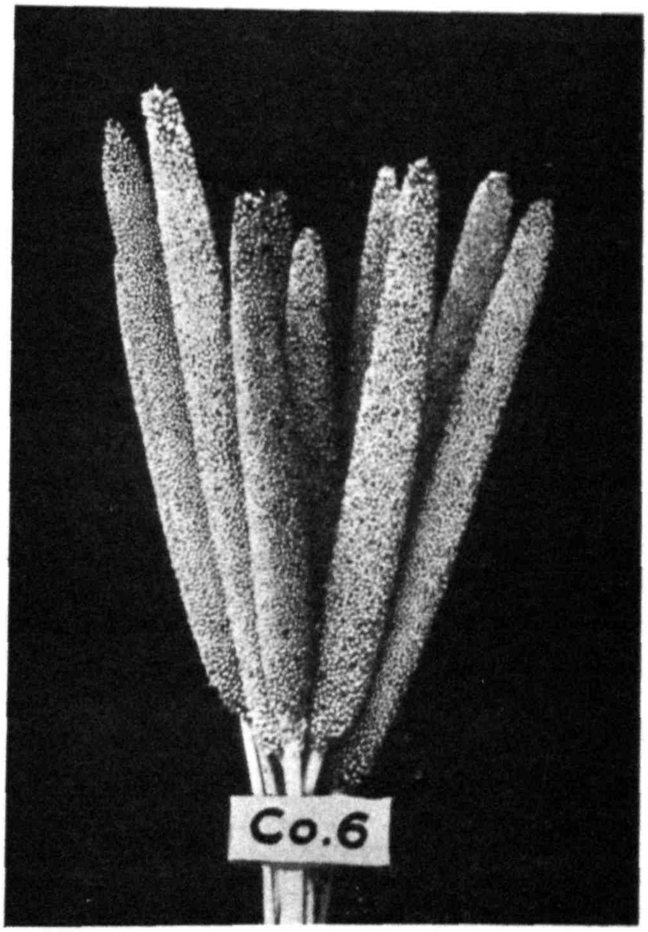
Rat Eradication Campaign by Students in villages



Co. 40 'Raja Rajan' — a new variety superior to Co. 25



Co. 21 Sorghum — a new high yielding pest and disease resistant variety

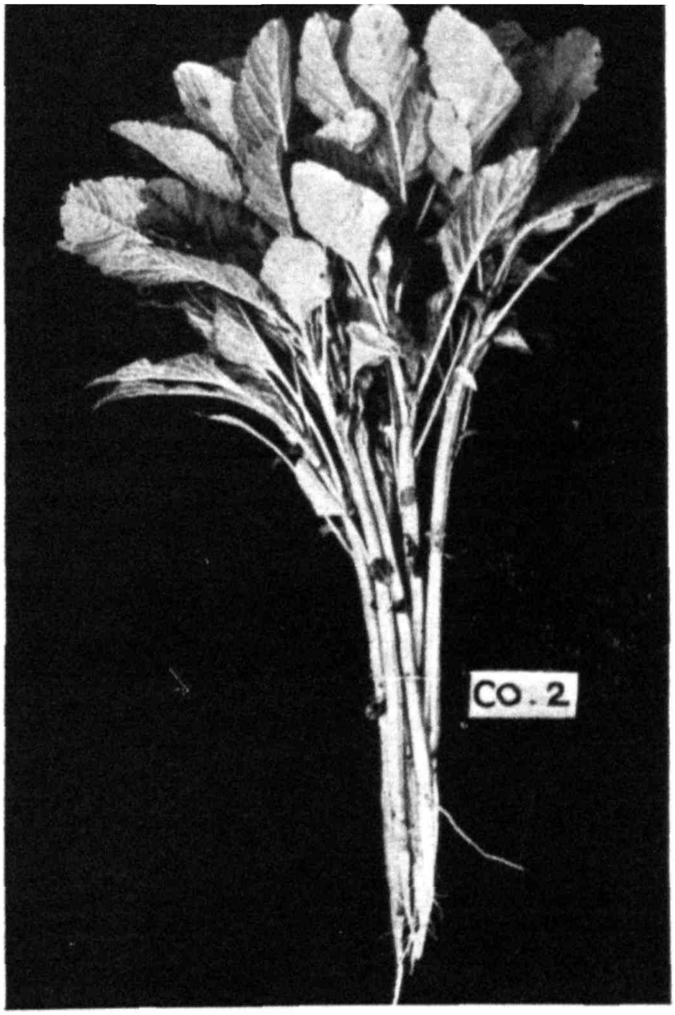


Co. 6 Bajra — a new high yielding disease-resistant variety

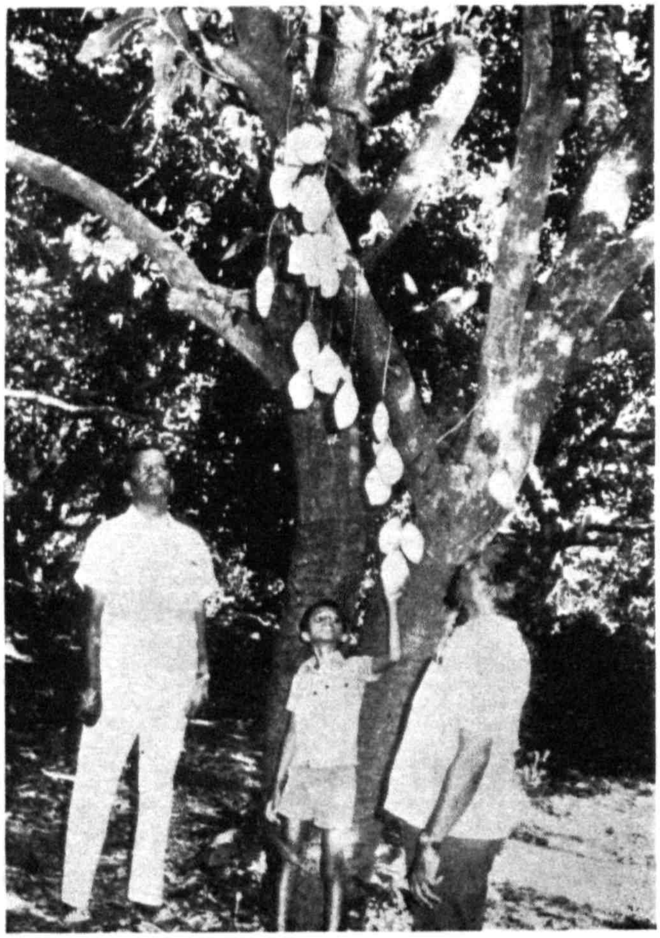
Co. 3 Redgram — High yielding disease - resistant variety

Co. 9 Lab-lab — Delicious vegetable-cum-grain *Avarai* for all seasons

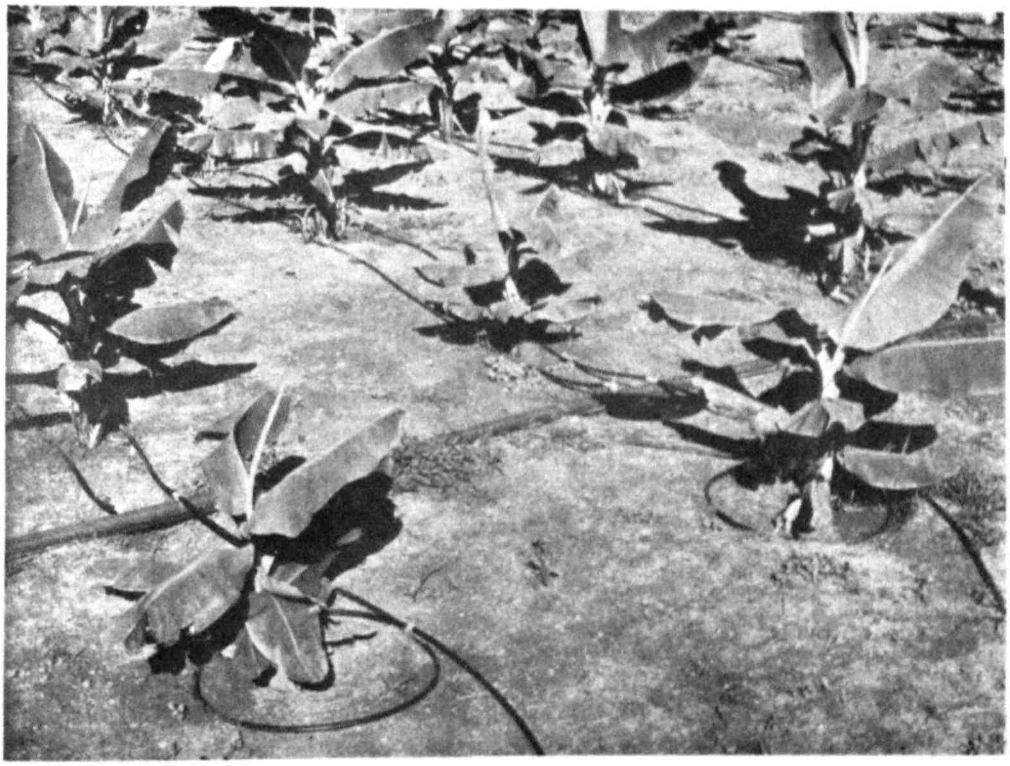
MDU 1 Chillies — High yielding, cluster-bearing variety with high pungency



Co. 2 Amaranthus — High yielding leafy vegetable

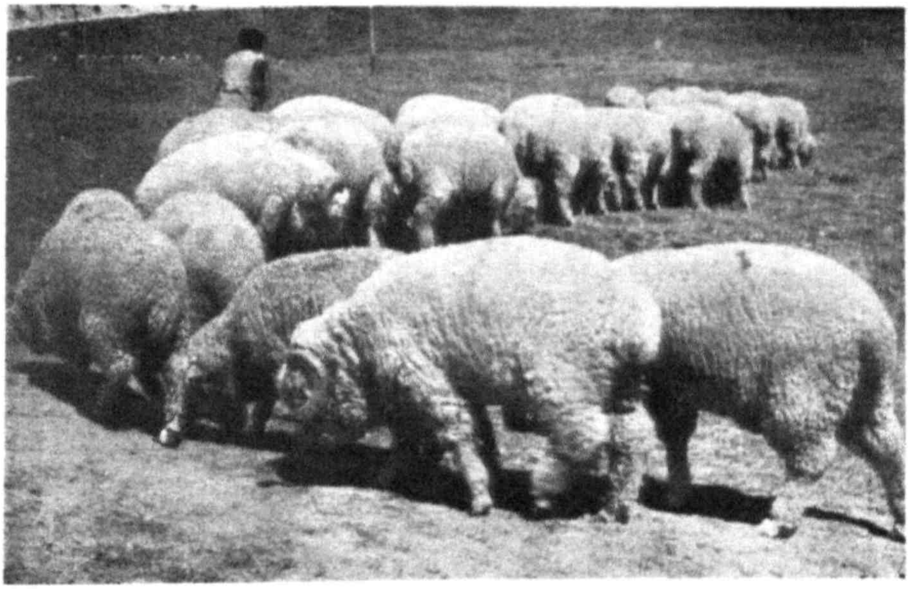


Mango pruning that makes old trees bear

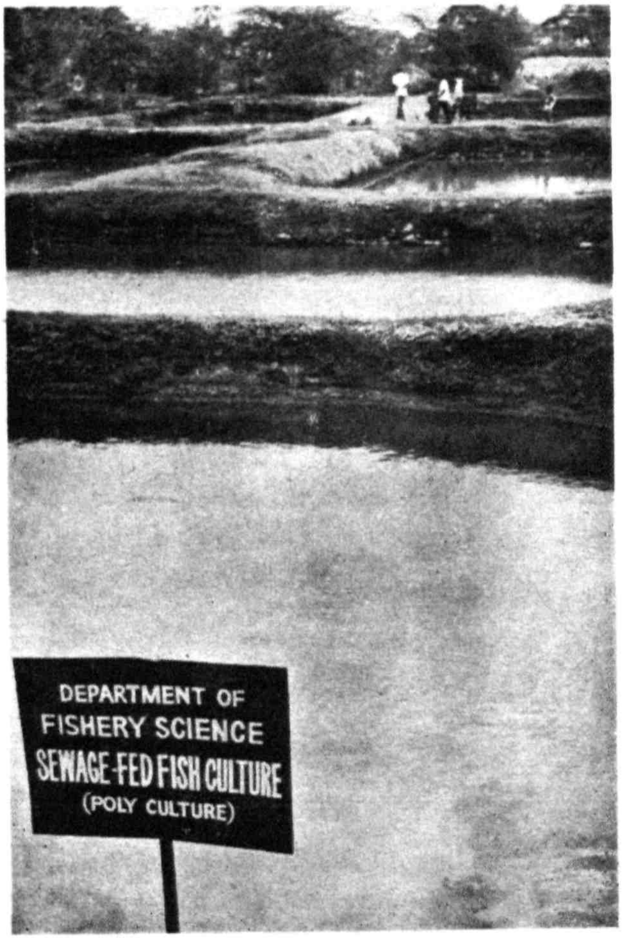


Drip Irrigation in Banana — Saves 60% of irrigation water

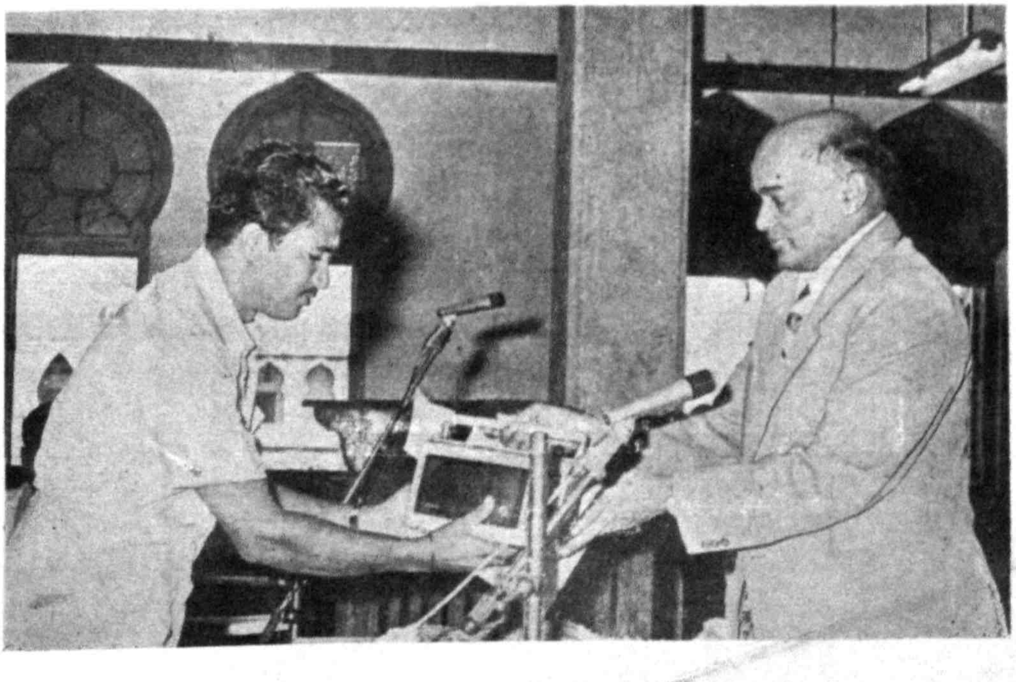
Portable Gobar Gas Plant for every farm home



The Nilgiri Sheep under improvement



Rearing of Fish in sewage water



Distribution of Transistor to the best convenor of Farmers' Discussion Group,
Farmers' Training Centre, Coimbatore

Vice-Chancellor distributes Soil Test Kit to a Soil Health Care Trainee at the Madurai Campus